The Iron Age

A Review of the Hardware and Metal Trades.

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Improved Hydraulic Engine.

The extensive introduction of water works in this country, the cheapness of the water supply and its abundance, have turned the attention of a great many small manufacturers to the use of the water thus supplied for the production of power. Many machines for this purpose have been built from time to time, usually by those who wish to employ them. The Pratt & Whitney Company, of Hartford, Conn., are building small machines of this kind for the market, one of which we illustrate.

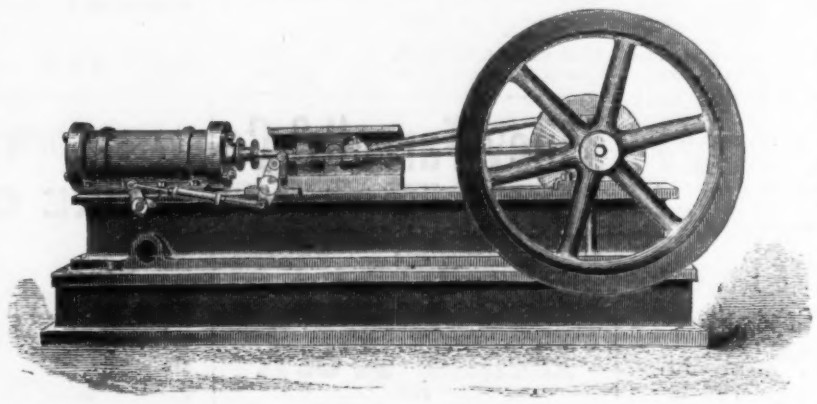
It is a reciprocating hydraulic engine, with an adjustable stroke, which latter peculiarity is obtained by having, instead of the ordinary crank, a disk on which the crank-pin can be moved from two to four inches from the center of the fly-wheel.

We should remark here that such an arrangement would be very injudicious if applied to a steam engine. By shortening the crank and corresponding stroke, the piston does not reach the ends of the cylinder, and when the propelling medium is elastic, like steam, this involves a great waste of motive power; water, however, being incompressible (at least in regard to these practical purposes), there is no loss of power where the piston is caused to return when at a distance from the cylinder head, as the space remains filled with the incompressible fluid.

The power of the engine here represented is adapted to run easily movable machinery, as printing presses, sewing machines, or lathes, drilling machines, etc., in small shops, and may be very desirable when the use of steam is inconvenient or objectionable. It is a very compact and easily managed motor, as the development of power is under absolute control, by regulating the amount of water used, and the length of stroke according to the pressure at disposal.

The valve of the engine is single balanced, and is not liable to derangement; it may be run with as little as 20 pounds pressure to the square inch, corresponding to a head of water in the reservoir of 45 feet, although a higher head and pressure is desirable; it may make from 40 to 75 revolutions per minute; the diameter of the cylinder is 5 inches, and the length of stroke adjustable from 4 to 8 inches. It consumes therefore from 77 to 154 cubic inches of water per stroke, and for 40 revolutions, or 80 strokes, equal to 200 to 400 pounds of water per minute, developing for a head of 50 feet of water from 10,000 to 20,000 foot-pounds, or from one third to two-thirds of a horse-power. When running at 75 revolutions per minute, or almost double that velocity, the power is of course doubled; while for a head of 100 or more feet, as we have in many parts of New York and Brooklyn, it may be made to develop easily a power of 2 or 3 horses.

The machine is delivered complete in an iron frame, and may be located anywhere at a moment's notice, requiring nothing but the attachments, namely, the inlet and outlet pipes. The whole weight of the complete machine is only 600 pounds.



IMPROVED HYDRAULIC ENGINE.

L. Bailey's Patent Bevel and Try Square.

These tools, although comparatively new, have received high commendations from those who have used them. They are made entirely of metal, and, while their style and finish are in every way satisfactory, their cost is not greater than that of other first-class tools of the same kind. The bevel may be set in a moment by a lever operated at the end of the handle, instead of a thumb screw on the side. By this arrangement we have a flush bevel, which, will, regardless of the position, lie flat upon the surface on which it is desired to be used, the advantage of which will be appreciated by those who wish to use it on flat surfaces for drawing, etc. The try squares are, in a measure, adjustable, the handle and blade being fastened by means of a screw passing through both parts, the screw having a taper where it passes through the blade, and bearing only on the lower edge of the hole made to match the taper on the screw, thereby forcing the blade firmly against the shoulder of the handle.

The object of this arrangement is to make a perfect square, which will not get out of place, by fitting the parts exactly before screwing them together, which will also enable the purchaser, in case of wear or accident, to take it apart for repair and put it together without difficulty. The blades are hardened, and the tools warranted equal in perfection to any in market.

They are the production of Mr. L. Bailey, the inventor of Bailey's Patent Adjustable Bench Planes, and are manufactured by L. Bailey & Co., a new establishment under Mr. Bailey's direct control, at Hartford, Conn.

BAILEY'S PATENT BEVEL AND TRY SQUARE.

American Leather for Export.—The *Shoe and Leather Reporter* says: "Within a few days there have been sales of wax and grain upper leather to go across the water. These purchases are made directly by a manufacturer who knows what he is about. Of course the prices are low. The prices of upper are generally much below those obtained before the war. This state of things cannot continue very long without inducing other large shipments of both rough and finished upper."

Failure of Postal Telegraphy in England.

Professor W. Stanley Jevons has, in the last *Fortnightly*, an apparantly unanswerable article on the post office telegraphs, which presents an unsatisfactory condition of things, such as has not popularly been supposed to exist. The increase of business is first shown. From 6,000,000 the number of messages annually transmitted has risen to 20,000,000, and there are forwarded 22,000,000 words of press report as against 2,000,000 in 1870. There are 5600 offices as against 2000 under the administration of the companies, with 11,600 instruments, compared with 6200; 24,000 miles of line and 108,000 of wire, as compared with 16,100 and 77,450, and the average cost of messages has been decreased from 43 to 23 cents, gold. Notwithstanding, the working expenses have increased steadily and in an alarming ratio. In 1871 they were 57 per cent.; in 1872, 78¾ per cent.; in 1873, 89½; in 1874, 91⅛, and in 1875, 96 2-3. The net revenue has steadily decreased, as follows: First year, £303,456; second, £159,834; third, £103,120; fourth, £90,033; fifth, £36,725; so that it is utterly inadequate to pay interest on the £10,000,000 invested in the scheme, or to meet contingent expenses and liabilities.

The miscalculations or misrepresentations made throughout are almost incredible. Had Mr. Scudamore's calculations been correct there would now be a net revenue of £600,000. He estimated the cost of the property and rights at £2,400,000; about £6,000,000 have already been paid, and there are yet to be met several contingent claims of unknown amount. The cost of extensions and reorganization was placed at £100,000; it really amounted to "several millions." Instead of a smaller staff of engineers and managers, the government has one comparatively greatly in excess of that formerly employed by the companies, and all the salaries have been raised, so that government pays more than private employers for the same class of work. It cost the companies £12,000 a year to keep their accounts, and it costs the government more than that sum; Mr. Scudamore's estimate was £1000.

The assertion that there is an analogy between this state of affairs and the post office after the introduction of penny postage, Mr. Jevons traverses effectually. A ton of mail bags can as easily be forwarded as one bag, and a postman can carry a hundred letters as well as one, but each telegram has to be individually received, written, transmitted and delivered by special messenger, so that every increase of traffic involves an increase of expense in nearly the same ratio. Nor was there any reason why the authorities should have committed the blunder of calculating that a low rate would increase business and also prove profitable. The United Kingdom Company tried the shilling rate between the large towns and it had proved a failure. The London District Company could not make sixpenny and fourpenny messages pay working expenses. Mr. Grunston, president of the Electric and International Company, had shown the commission conclusively that in the government telegraphs of Switzerland and Belgium low charges had never really paid the working expenses.

The writer then goes on to consider what is to be done, not deeming it just that the country should be taxed £500,000 a year to maintain the system. If the telegraph is a profit and convenience to the person who uses, why should he not pay the real working expenses of it? Why should other people be taxed for his convenience? The vastly increased business has been largely of a trivial character, and the ruinously low rates at which press dispatches are carried, practically amounting to subsidizing the newspapers, are productive of no benefit. The net loss must be steadily increased by renewals of posts and wires, whose life expires in 1883, pensions, railway claims and other contingent expenses. It is thought that a remedy will be found in a reduction of the rate to sixpence, but Mr. Jevons calculates that this would but increase the annual deficiency to £1,250,000.

The government made its estimates on the showing that in the Electric and International Company an increase in business of 105 per cent. was transacted with an addition to the working expenses of 33 per cent., but the theory did not prove true, for the business of the Government telegraphs has since 1871 increased 81 per cent., and the advance in current working expenses has been 110 per cent., even with the introduction of the duplex system, which doubles the carrying power of the wires.

Of the suggestions made by the Treasury Commission, Mr. Jevons considers that including the addresses in the twenty words the most practical. At present the sender's address averages four words, the receiver's eight, the message seventeen, and the private service instruction of the operator fourteen, making an average of forty-three words for each shilling message.

[NOTE.—The allowance of fourteen words for instructions is needlessly, wastefully great, but Mr. Jevons makes no allowance for repeating through messages or messages concerning administration, which would probably bring the average number of words for each shilling paid up to fifty.] The inclusion of the addresses would leave the sender ten or eleven words, which would be amply sufficient, as the tendency of a twenty word system is to the employment of needless verbiage. [Here Mr. Jevons might have quoted our American experience of the ample capacity of a ten word message.] But not even the saving of labor to the service of about 25 per cent., unless accompanied by a heavy addition to the press tariff, will bring about a satisfactory balance sheet.

Mr. Jevons would like to see the government try for once and finally the experiment of a six-penny rate for short messages, since nothing short of a complete break down will ever convince the people that low rates and high profits are incompatible, and that they must discriminate between the financial conditions of letter-carrying and telegraphy. He regrets the financial failure of the Telegraph Department because it puts an almost insuperable obstacle in the way of any further extension of government industry in the present generation. The operation can hardly ever be repeated, even on a small scale, when it is remembered how profits running for ten years only were bought at twenty years' purchase; how the owners of a rotten cable, since relaid, received more than the whole money they had spent upon it; and how the extension of the telegraph lines, when purchased, considerably more than the whole of what had previously been spent by the companies on the invention and introduction of the system. The accounts of the Telegraph Department unfortunately demonstrate what was before to be feared—namely, that a government department cannot compete in economy with an ordinary commercial firm subject to competion.

At a recent distribution of prizes at Greenwich, Mr. Gladstone delivered an eloquent address, in the course of which he said that one of the first results of elementary education was to produce a desire on the part of young persons or in their parents to escape from the necessities of manual labor, and pass into what is called head work. Here they had before them a very important subject. There was far too much eagerness on the part of the working classes to get out of the working class into another which was not a working class. The first thing a man ought to do was to elevate his vocation. A workman ought to strive to raise the character of the work he performed, and in doing that he was doing more to raise himself and his family and class than by hurrying out of his position. Hand labor was progressively and rapidly rising, whereas head labor was falling. The ex-Premier, in conclusion, urged that what the workingman should aim at was to raise the character of the labor which he was called upon to perform.

The First Steam Flour Mills.

In the year 1783 the power of steam was first applied to the grinding of corn at the Albion Mills, erected at the Southwark foot of Blackfriars bridge, London. This erection was most unjustly calumniated in its day, under an idea that it was a monopoly injurious to the public; a very erroneous notion, as it was the means of considerably reducing the price of flour while it continued at work. It was destroyed by fire in 1791, an occurence which has, with great reason, been imputed to design. The operation of grinding, by whatever power is now performed by two horizontal stones, being placed at a short distance one above the other; the lower being immovable, while the upper one turns upon a spindle, and has a hole in its center through which the corn passed. The flour mill erected by Messrs. George and John Renno in the Royal William Victualling Yard, Plymouth, in 1833, was considered one of the most complete of its kind, and the following is a description of it:

The building which contains it is nearly 240 feet in length, and about 70 feet in hight; each wing contains 12 pair of stones, driven by a 45 horse-power engine, situated in the body or central of the building. The stones are 4 feet 3 inches in diameter, and make 123 revolutions per minute, each pair grinding about five bushels of corn in an hour, or, which is nearly the same, the mill when at full work will grind upward of 12 bushels in an hour by two 45 horse-power engines, and at the same time work eight dressing machines and four scrolling or cleaning machines, for preparing the flour to be ground. The corn to be ground is deposited in the upper floor in bins situated between cast iron pillars, from which it is conducted by spouts to the screening machines; the purpose of these is to separate the sand and other extraneous matter, which unavoidably becomes mixed with the corn. They consist of a cylindrical sieve divided so as to resemble an Archimedes screw, so that the corn being admitted at one end, has, by the revolution of the cylinder, to pass over a great surface of wire, which takes from it the greater portion of the sand and dirt. When it arrives at the end of the machine it falls into a hopper, from which it is conducted by spouts to the millstones; one of these screening machines will supply sufficient corn for six pair of stones. One of the main vertical shafts is continued up to the roof of the mill, in order to give motion to the sack tackle or machinery by which the corn, after being ground, is elevated to the upper floor to be passed through the dressing and bolting machines, situated on the second floor, by which process the fine and coarse parts of the flour are separated from each other. The sack tackle is very simple. It consists of a barrel, situated on a horizontal shaft having bearings on the two beams of the roof; it receives motion, when required, by a system of wheel work communicating with a beveled wheel on a vertical shaft; a rope is wound round the barrel, and precedes to the bottom of the mill, by which a sack of flour may be readily raised to any floor of the mill by merely putting the wheel work in gear. The dressing machines and bolting mills are situated on the second floor of the mill.

The flour, after being divided by the dressing machines into the different degrees of fineness required for the different purposes, is conveyed by spouts to the lower floor, when it is received into sacks.

The floors are constructed in this mill of wood, and are supported by cast iron pillars; but in the Deptford mill, which has since been erected, Messrs. G. & J. Renno have preferred the use of cast iron, both in the floors and in the roof, which has not only the great advantage of superior durability, but that of rendering the mill perfectly secure against fire, an accident to which flour mills are very liable.

Each house in London is supplied with a tank of a regulated size, and each morning a man comes along and turns on the water from the street main until this tank has time to fill, and then turns it off again until the next day. Of course standing thus all day, especially in summer and where ice is an almost unknown luxury, it becomes very insipid for drinking purposes. But that makes no difference to the average Londoner. He rarely drinks any water any way!

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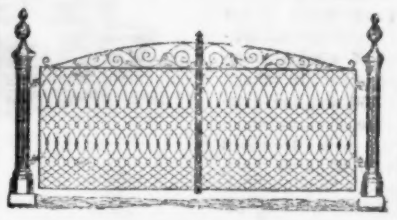

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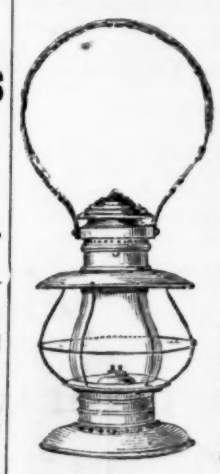

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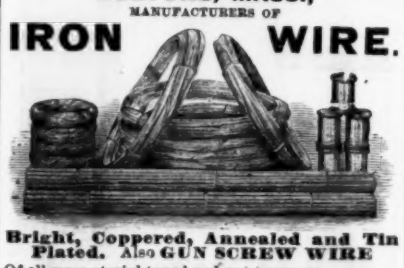

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The Dissociation of Water by Heat a Cause of Boiler Explosions.

We condense the following from an article by Dr. L. Bradley in the *American Chemist*: The elements of vapor, then, under atmospheric pressure, alone, dissociate at 1298° Fah. If, therefore, we heat a bar of iron to fully 1298°, and place it over a globule of water upon an anvil, a blow with a hammer will elicit the detonation of a rifle; I have repeated this experiment often. The elements of the water dissociate by the heat, and instantaneously recombine in cooling, causing the detonation. But the degree of dissociation, as well as that of vaporization, is elevated by pressure, and in the same proportion; the additional thermometric elevation then, according to the table of Regnault, for each atmosphere (15 pounds) of pressure is about 143°, making the degree under four atmospheres (60 pounds) pressure 1870°, very near that of the fusion of silver. The temperature of dissociation is as fixed and certain under different pressures as is that of vaporization. The question arises: Why do not the molecules of vapor, dissociated upon the inner surface of a boiler, instantaneously recombine, as in the case above? The answer is plain; instead of re combining, the atoms instantaneously become mixed with seven or more times their volume of steam, in which case the mixture is non-explosive.

The condition requisite for the generation of explosive gas in a boiler is, steam in contact with a highly heated surface. This may supervene when the water is allowed to fall below the fire line; or (what is, perhaps, equally or more common) when the water, in the lower part of the boiler, assumes the spheroidal state.

We have all noticed the phenomenon of a globule of liquid, rolling about on a heated metallic surface without touching the metal; the globule is in the spheroidal state, supported and held up by a cushion of vapor; the water assumes the same state in a heated boiler, and is held separate from the boiler surface by a layer of steam.

Upon this point I will refer to a few authorities. Bourne, in his valuable treatise on the steam engine, last edition, at page 80, says: "The spheroidal condition of liquids has been illustrated by the experiments of Tyndall, Church and Normandy." From Church's experiments, it appears that it is necessary for the liquid to emit vapor before it can assume the spheroidal state. Molten lead dropped upon a very hot platinum plate, did not assume the spheroidal state; whereas, mercury dropped upon this plate, assumed the spheroidal state at once.—*Ibid.* p. 80.

There can be no doubt that the water is sometimes repelled from the metal, in the same manner as would be done if it were in the spheroidal state, and explosions have, no doubt, frequently had their origin in this phenomenon. *Ibid.* p. 80.

Some boilers can at any time be made red hot by very heavy firing. So soon as the fire is made to burn freely, the water will disappear from the lower gauge cock, and show in the upper one, thus proving that the water has been repelled until it occupied the top part of the boiler instead of the bottom part.—*Ibid*, p. 81.

The phenomenon of priming, or boiling up, when boilers are heated very strongly, appears to be connected with the spheroidal condition. —*Ibid.* p. 215.

Here, speaking of the spheroidal state, Bourne says: "The globules, however high the temperature of the metal may be on which they are placed, never rise above a temperature of 205°, and give off a very little steam."

Tyndall also says (*Heat as a Mode of Motion*, p. 178): Boiler explosions have also been ascribed to the water in the boiler assuming a spheroidal state.

By our own observations, we know that the globule on the heated plate is spheroidal, even when the plate is below a very low red heat, far below the heat required for dissociation of the vapor. It seems, therefore, not difficult to conclude that in a case of very heavy firing, a thin film of vapor, which is a bad conductor of heat, may form between the water and the boiler, and when once formed, the heating of the boiler would be so rapid that nothing but the extremely and kindly cooling process of dissociation which would then commence could save it from completely burning through.

The repellant power of heat has been illustrated on many occasions.

Jacob Perkins, of steam artillery notoriety (*Am. Journ. of Science and Art*, vol. xiii. 1828, p. 46), says: "I discovered that a generator at a certain temperature, although it had a small crack in it, would not emit either water or steam. This fact I mentioned to a very scientific friend, who questioned its accuracy, and to convince him I tried the experiment; but he concluded that the expansion of the metal must have closed the fissure. To remove every doubt, I drilled a small hole through the side of the generator.

"After getting steam up to a proper temperature, I took out the plug, and although we were working the engine at thirty atmospheres, nothing was seen or heard to issue from the plug hole; all was perfectly quiet; I next lowered the temperature by shutting the damper and opening the furnace door. A singing from the aperture was soon observable, and when a coal was held before it, rapid combustion ensued. Nothing was yet visible, but as the temperature decreased the steam became more and more visible, the noise at the same time increasing, until finally the roar was tremendous, and might have been heard at the distance of half a mile.

"This was conclusive. At the aperture the iron was red hot. We may safely aver that the distance from the heated metal at which the water remained, when under the pressure of 30 atmospheres, exceeded one-eighth of an inch, as the hole was one-quarter of an inch in diameter."

To ascertain whether the repulsion stated by Perkins to exist between the particles of intensely heated iron and water be general, the committee of the Franklin Institute (*Franklin Journal*, vol. xvii. 1836, p 226) repeated his experiment with the effect of proving satisfactorily the affirmative of the question.

In the *Franklin Journal*, vol. x. 1845, pp. 182 and 265, we find a very full and able discussion on the spheroidal state of water, alcohol, ether and liquid sulphuric acid, by John Edwards Bowman, in which he shows that the temperature of the spheroid in a heated bowl is always at a temperature below the boiling point by from 2° to 7°. Pure alcohol, which, under ordinary circumstances, boils at 173°, never rises when in the spheroidal state higher than about 170°, and ether, whose boiling point is about 100°, and which almost boils with the heat of the hand, cannot be induced when thrown into a crucible heated to whiteness in a smith's forge to rise above 95°! The same remarkable results are obtained if, instead of pouring the liquids while cold into the red hot vessel, they are absolutely boiling at the moment; strange and almost incredible as it may appear, the instant they reach their fiery resting place, they absolutely become cooler, and, as it were, shaking off the trammels of all known laws of nature, *cease to boil.*

The rapidity with which water in the spheroidal state evaporates is in proportion to the temperature of the containing vessel. * * But at the temperature of 400° it is 50 times more slow than of ordinary boiling water at 212°. * *

The only way of explaining the low temperatures of spheroids is to suppose they have the property of perfectly reflecting the radiant heat emanating from the sides of the hot vessel. The film of vapor surrounding them is incapable of conducting, but is superheated—*i. e.*, stands at the temperature of the vessel. * * * Water in a small glass bulb, placed in the spheroid, showed no tendency to boil, but placed in the film, boiled instantly. Water at 32° or 212°, thrown into the hot vessel, immediately came to the same temperature, 205°.

From the foregoing, and many other evidences to which I might refer, if space permitted, it is clearly proven that water, either cold or hot, never comes in contact with a red-hot surface.

Having thus explained and clearly shown the condition in which explosive gas is generated in a boiler, it only remains for me to point out the circumstances under which the relative quantities of the gas and the steam are brought to the explosive proportions. These are, in general, two: First, the continued generation of the gas until it *rises* to the explosive proportion; and, second, the condensation of the steam until it *falls* to the explosive proportion.

To illustrate, I will condense the newspaper accounts of a few cases of boiler explosions.

CASE I.

[NEW YORK WORLD, AUGUST 19, 1871.]

(From the Buffalo *Express.*)

"On Monday afternoon last, the Chitaqua left her mooring at Mayville, with 30 passengers * * * The explosion occurred about 6:20 o'clock, and after the steamer had been at the dock about ten minutes."

The account is lengthy and indicates a thoroughly disastrous explosion—all on board killed or wounded. The boiler had been twice tested to 300 lbs. It was supposed that it might have had, at the time, 100 lbs., though but 60 pounds, generally, on the trip. The fireman engineer says that the boiler acted strangely from Mayville to the fatal landing. He says: "It kept frothing," which was something unusual, but he gave it no special attention.

In this case, the water in the bottom of the boiler was in the spheroidal state, and, after the landing, the gas continued rapidly accumulating, till it reached the explosive proportion.

CASE II.

[NEW YORK HERALD, MAY 19, 1868.]

DREADFUL CATASTROPHE.

"*Fire in the Bowery, and Explosion of Fire Engine No. 9—Five Persons Killed, and Twenty-two Seriously Injured.*

"The engine had a full head of steam on at the time, and was playing on the fire at No. 53 Bowery. The reporter says: 'The explosion is supposed to have resulted from a lack of water in the boiler, the iron plates becoming overheated, and the cold water being suddenly put in, generated a species of gas as well as steam, thereby causing the explosion.'"

CASE III.

[NEW YORK HERALD, OCTOBER 27, 1867].

Explosion at Union Hill, N. J.

"The accident, it is believed, had its origin in the usually disastrous mistake of injecting cold water into a red hot boiler."

In these cases (II. and III.), the introduction of cold water had the effect of condensing the steam down to the explosive proportion.

CASE IV.

[SEMI-WEEKLY TRIBUNE, NOVEMBER 16, 1867].

A Fearful Explosion of the Donkey Boiler of the Steamer Matansas.

"The engine had been at rest since 4 p. m. * * * The fire was banked up * * * At the time of the accident, according to the story of the fireman, only four or five pounds of steam was on, and the water was up to the third cock in the boiler."

This was a case in which the steam gradually condensed down to the explosive proportion.

CASE V.

[SCIENTIFIC AMERICAN, FEBRUARY, 9, 1861.]

"A correspondent, Mr. Daniel Edwards, of Little Genessee, N. Y., says: 'When the steamboat Moselle blew up near Cincinnati, I was in plain sight of the disaster.'"

After describing the terrible catastrophe, he says: "The persons said to be scalded did not look so to me; their skin was quite brown and crisp; it looked more like a burn from gunpowder."

Query.—Was it steam or gas that exploded? There were five boilers all burst with one deep heavy sound, and not as if several explosions had taken place in rapid succession.

There are two kinds of accidents to which steam boilers are subject, which are no more alike than the bursting of a barrel of beer and the explosion of a barrel of gunpowder. Of the former, I propose to say nothing; but as to the latter, I think I may justly claim to have shown, by the foregoing collation of authorities, facts and figures, that the great and devastating explosions are caused by the dissociation of water by heat.

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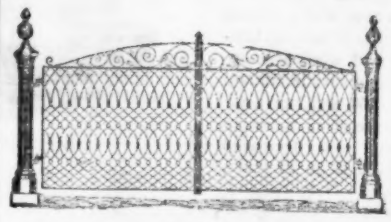

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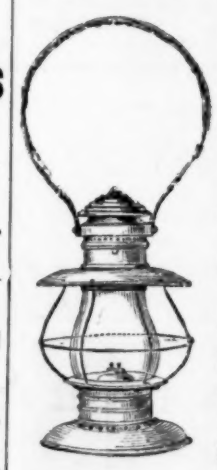

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Here, speaking of the spheroidal state, Bourne says: "The globules, however high the temperature of the metal may be on which they are placed, never rise above a temperature of 205°, and give off a very little steam."

Tyndall also says (*Heat as a Mode of Motion*, p. 178): Boiler explosions have also been ascribed to the water in the boiler assuming a spheroidal state.

By our own observations, we know that the globule on the heated plate is spheroidal, even when the plate is below a very low red heat, far below the heat required for dissociation of the vapor. It seems, therefore, not difficult to conclude that in a case of very heavy firing, a thin film of vapor, which is a bad conductor of heat, may form between the water and the boiler, and when once formed, the heating of the boiler would be so rapid that nothing but the extremely and kindly cooling process of dissociation which would then commence could save it from completely burning through.

The repellant power of heat has been illustrated on many occasions.

Jacob Perkins, of steam artillery notoriety (*Am. Journ. of Science and Art*, vol. xiii. 1828, p. 46), says: "I discovered that a generator at a certain temperature, although it had a small crack in it, would not emit either water or steam. This fact I mentioned to a very scientific friend, who questioned its accuracy, and to convince him I tried the experiment; but he concluded that the expansion of the metal must have closed the fissure. To remove every doubt, I drilled a small hole through the side of the generator.

"After getting steam up to a proper temperature, I took out the plug, and although we were working the engine at thirty atmospheres, nothing was seen or heard to issue from the plug hole; all was perfectly quiet; I next lowered the temperature by shutting the damper and opening the furnace door. A singing from the aperture was soon observable, and when a coal was held before it, rapid combustion ensued. Nothing was yet visible, but as the temperature decreased the steam became more and more visible, the noise at the same time increasing, until finally the roar was tremendous, and might have been heard at the distance of half a mile.

"This was conclusive. At the aperture the iron was red hot. We may safely aver that the distance from the heated metal at which the water remained, when under the pressure of 30 atmospheres, exceeded one-eighth of an inch, as the hole was one-quarter of an inch in diameter."

To ascertain whether the repulsion stated by Perkins to exist between the particles of intensely heated iron and water be general, the committee of the Franklin Institute (*Franklin Journal*, vol. xvii. 1836, p 226) repeated his experiment with the effect of proving satisfactorily the affirmative of the question.

In the *Franklin Journal*, vol. x. 1845, pp. 182 and 263, we find a very full and able discussion on the spheroidal state of water, alcohol, ether and liquid sulphuric acid, by John Edwards Bowman, in which he shows that the temperature of the spheroid in a heated bowl is always at a temperature below the boiling point by from 2° to 7°. Pure alcohol, which, under ordinary circumstances, boils at 173°, never rises when in the spheroidal state higher than about 170°, and ether, whose boiling point is about 100°, and which almost boils with the heat of the hand, cannot be induced when thrown into a crucible heated to whiteness in a smith's forge to rise above 95°! The same remarkable results are obtained if, instead of pouring the liquids while cold into the red hot vessel, they are absolutely boiling at the moment; strange and almost incredible as it may appear, the instant they reach their fiery resting place, they absolutely become cooler, and, as it were, shaking off the trammels of all known laws of nature, *cease to boil.*

The rapidity with which water in the spheroidal state evaporates is in proportion to the temperature of the containing vessel. * * But at the temperature of 400° it is 50 times more slow than of ordinary boiling water at 212°. * *

The only way of explaining the low temperatures of spheroids is to suppose they have the property of perfectly reflecting the radiant heat emanating from the sides of the hot vessel. The film of vapor surrounding them is incapable of conducting, but is superheated—i. e., stands at the temperature of the vessel. * * * Water in a small glass bulb, placed in the spheroid, showed no tendency to boil, but placed in the film, boiled instantly. Water at 32° or 212°, thrown into the hot vessel, immediately came to the same temperature, 205°.

From the foregoing, and many other evidences to which I might refer, if space permitted, it is clearly proven that water, either cold or hot, never comes in contact with a red-hot surface.

Having thus explained and clearly shown the condition in which explosive gas is generated in a boiler, it only remains for me to point out the circumstances under which the relative quantities of the gas and the steam are brought to the explosive proportions. These are, in general, two: First, the continued generation of the gas until it *rises* to the explosive proportion; and, second, the condensation of the steam until it *falls* to the explosive proportion.

To illustrate, I will condense the newspaper accounts of a few cases of boiler explosions.

CASE I.

[NEW YORK WORLD, AUGUST 19, 1871.]

(From the Buffalo *Express.*)

"On Monday afternoon last, the Chitaqua left her mooring at Mayville, with 30 passengers * * * The explosion occurred about 6:20 o'clock, and after the steamer had been at the dock about ten minutes."

The account is lengthy and indicates a thoroughly disastrous explosion—all on board killed or wounded. The boiler had been twice tested to 300 lbs. It was supposed that it might have had, at the time, 100 lbs., though but 60 pounds, generally, on the trip. The fireman engineer says that the boiler acted strangely from Mayville to the fatal landing. He says: "It kept frothing," which was something unusual, but he gave it no special attention.

In this case, the water in the bottom of the boiler was in the spheroidal state, and, after the landing, the gas continued rapidly accumulating, till it reached the explosive proportion.

CASE II.

[NEW YORK HERALD, MAY 19, 1868.]

DREADFUL CATASTROPHE.

"*Fire in the Bowery, and Explosion of Fire Engine No. 9—Five Persons Killed, and Twenty-two Seriously Injured.*

"The engine had a full head of steam on at the time, and was playing on the fire at No. 53 Bowery. The reporter says: 'The explosion is supposed to have resulted from a lack of water in the boiler, the iron plates becoming overheated, and the cold water being suddenly put in, generated a species of gas as well as steam, thereby causing the explosion.'"

CASE III.

[NEW YORK HERALD, OCTOBER 27, 1867].

Explosion at Union Hill, N. J.

"The accident, it is believed, had its origin in the usually disastrous mistake of injecting cold water into a red hot boiler."

In these cases (II. and III.), the introduction of cold water had the effect of condensing the steam down to the explosive proportion.

CASE IV.

[SEMI-WEEKLY TRIBUNE, NOVEMBER 16, 1867].

A Fearful Explosion of the Donkey Boiler of the Steamer Matansas.

"The engine had been at rest since 4 p. m. * * * The fire was banked up * * * At the time of the accident, according to the story of the fireman, only four or five pounds of steam was on, and the water was up to the third cock in the boiler."

This was a case in which the steam gradually condensed down to the explosive proportion.

CASE V.

[SCIENTIFIC AMERICAN, FEBRUARY, 9, 1861.]

"A correspondent, Mr. Daniel Edwards, of Little Genessee, N. Y., says: 'When the steamboat Moselle blew up near Cincinnati, I was in plain sight of the disaster.'"

After describing the terrible catastrophe, he says: "The persons said to be scalded did not look so to me; their skin was quite brown and crisp; it looked more like a burn from gunpowder."

Query.—Was it steam or gas that exploded? There were five boilers all burst with one deep heavy sound, and not as if several explosions had taken place in rapid succession.

There are two kinds of accidents to which steam boilers are subject, which are no more alike than the bursting of a barrel of beer and the explosion of a barrel of gunpowder. Of the former, I propose to say nothing; but as to the latter, I think I may justly claim to have shown, by the foregoing collation of authorities, facts and figures, that the great and devastating explosions are caused by the dissociation of water by heat.

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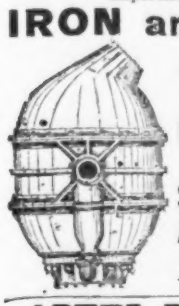
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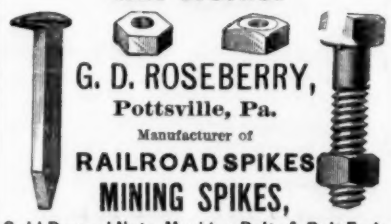
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New Patents.

We take from the records of the Patent Office at Washington the following specifications of certain patents lately issued, which will be found interesting:

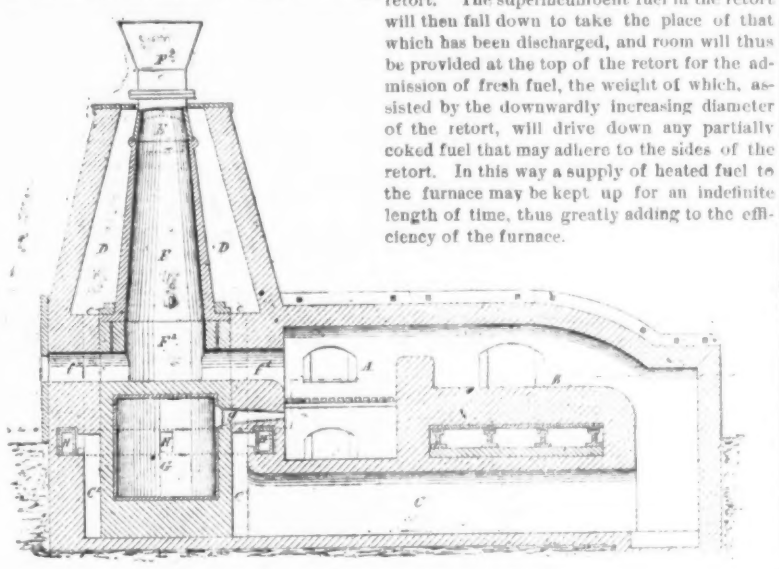
IMPROVEMENT IN REVERBERATORY FURNACES.

Specifications forming part of Letters Patent No. 169,581, dated Nov. 2, 1875, issued to John Price, of Sunderland, England.

The object of this invention is to utilize a larger percentage of the heating power of fuel than is ordinarily effected in the arts, and to extend the use of some solid fuels, which have at present but a limited application.

It applies to metallurgical and other furnaces, a special arrangement of which is employed. The advantages are due essentially to the heating of a continuous supply of fuel preparatory to its combustion in the furnace, partly in the gaseous and partly in the solid form, and also to the heating the air employed in keeping up such combustion. These effects are secured by utilizing the heat of the waste products of combustion of the furnace, to which the invention is applied in the manner to be presently explained.

In the accompanying drawings the invention is illustrated in connection with a reheating



IMPROVED REHEATING FURNACE.—*Fig.* 1.

furnace; but it will be obvious that in applying it to a puddling furnace, for example, no change in the arrangement will be required.

Fig. 1 is a central sectional elevation of a reheating furnace, and Fig. 2 is a sectional plan of the same.

A is the fire place or combustion chamber, fitted with fire bars, and B is the hearth, on which are piled the goods intended to be reheated. C C is a return flue, by which the gases of combustion are led away to an elevated conical chamber, D, which chamber is connected near its upper end by a flue, E, with a chimney shaft situate at any convenient distance from the furnace. Into this shaft the gases of combustion escape, and by its means the proper ventilation of the furnace is secured. The conical chamber D is constructed to receive a central conical retort, F, in which the fuel to be consumed in the furnace is intended to receive a preparatory heating from the waste gases of combustion on their passage to the chimney. The retort is open at bottom and rests upon brickwork F^1, carried by a cylindrical chamber, G, of cast iron. This brickwork F^1 forms virtually an extension of the retort, and serves to close the bottom thereof. $f f^1$ are two horizontal passages leading from the retort in one direction to the back of the furnace, and in the opposite direction to the combustion chamber, for the purpose to be presently explained. The retort is fitted at its upper end, externally of the chamber D, with a hopper, F^2, which may be closed at top by a lid and at bottom by a sliding valve, operated in any convenient manner. Its use is to discharge fuel into the retort from time to time, as required. The retort is made preferably of cast iron, and in two pieces, which are socketed together. The passage *f* is closed by a door at the back of the furnace, but the other passage f^1 remains open to the combustion chamber.

Referring now to the return flue C, which is used to conduct the heated gases from the reheating chamber to the back of the furnace, it will be seen that this flue terminates in a rectangular chamber of brick work, C^1, in the center of which is situate the air chamber G. In connection with this air chamber is an arrangement of air supply pipe, H, which are inclosed in the walls of the chamber C^1, but are open to the action of the heated gases contained therein. This system of pipes receives atmospheric air, compressed or otherwise, which circulates through the pipes, becoming thereby heated, and enters the central air chamber G. From this chamber the air, in a highly heated state, is discharged through an opening *g*, under the fire bars in the combustion chamber A, for the purpose of keeping up a rapid combustion. Fuel is fed to the combustion chamber A from the retort by pushing it forward through the passage f^1, a suitable instrument being introduced to the retort through the passage *f* for that purpose.

To provide for the heating of the fuel in the retort, the waste gases are led up from the chamber C^1, through flues *c c*, into the conical chamber D, around which they circulate before escaping by the flue E to the chimney. In this way the fuel will be highly heated at the expense of the waste gases on their passage to the chimney, and the fuel will thereby be caused to discharge its gaseous products into the fire chamber, where they will be efficiently consumed.

In starting the furnace, it will be understood that the fire must be lighted on the grate in the usual manner, and kept up by a supply of fuel through the door of the combustion chamber until the retort has become sufficiently heated. When this has been effected the further charging of the chamber will be from the retort. For this purpose the attendant will from time to time open the door of the passage *f* and drive forward, as before stated, the heated fuel which rests upon the bottom of the retort. The superincumbent fuel in the retort will then fall down to take the place of that which has been discharged, and room will thus be provided at the top of the retort for the admission of fresh fuel, the weight of which, assisted by the downwardly increasing diameter of the retort, will drive down any partially coked fuel that may adhere to the sides of the retort. In this way a supply of heated fuel to the furnace may be kept up for an indefinite length of time, thus greatly adding to the efficiency of the furnace.

It will be understood that by treating the fuel as above described, and bringing it and the air required to maintain combustion to a heated state, not only will a more perfect combustion of the fuel be effected than is now commonly secured, but the proportion of heat thereby generated will be largely increased, and very high temperatures may also be attained.

Claim.—The combination of the combustion chamber A, the heating chamber or hearth B, the return flue C, the retort heating chamber D, with its contained fuel retort F, and the hot air chamber G, for supplying heated air to the combustion chamber, with which the fuel retort is also in communication.

IMPROVEMENT IN ALLOYS FOR PREVENTING INCRUSTATION UPON METALS.

Specification forming part of Letters Patent No. 169,810, dated November 9, 1875, issued to Oliver Holden, of New York.

This invention relates to a new and improved alloy of metals for the prevention of incrustation upon iron or other metals, and is designed principally to prevent deposits in boilers and other vessels while using water impregnated with lime.

It also consists in a compound or alloy of zinc, tin, lead, bismuth and antimony, mixed together in the following proportions, viz.: Zinc, one hundred and ninety-four parts; tin,

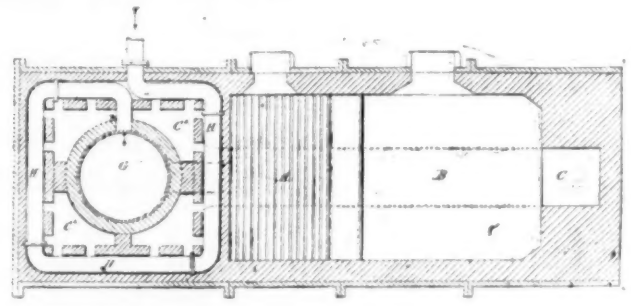


Fig. 2.

fifty-eight parts; lead, twenty-six parts; bismuth, eighteen parts; antimony, sixteen parts. These are combined, forming an alloy, by melting them together, or by melting separately and mixing the same.

The alloy or composition is used by applying it in the form of rivets or bolts inserted in various portions of the boiler or in the shape of rings, bands or plates, which are hung upon the tubes or flues of the boiler, or otherwise fastened to the same in any convenient manner.

A combination of tin and zinc has heretofore been employed, and, under some circumstances, will produce beneficial results; but a combination of such metals may produce electrical action in certain solutions without preventing injurious deposits—as, for example, in certain lime waters, such as the Croton of New York, lime will be deposited, even when tin and zinc may be combined and applied as above stated; but with the addition of lead, bismuth and antimony, as in the present invention, such deposit will be prevented, even though the impregnation with lime be very great.

Claim.—An alloy for preventing incrustation upon metals, consisting of zinc and tin, lead, bismuth and antimony, in the proportions set forth.

We take the following abstract of new patents, issued November 9th, from the official record:

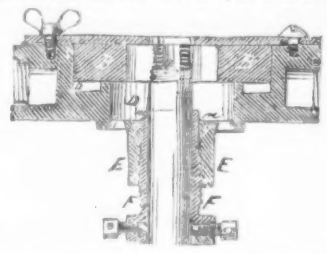
CHAIN-BELT.

To Henry Bushnell, New Haven, Conn.—Nov. 16.—The herein described chain, consisting of

the principal links, composed of two sides connected by parallel tubular bars, and intermediate links, composed of two sides, each with a stud at each end, corresponding to and inserted and secured in the tubular bars, substantially as described, so as to make connections with the principal links.

THREADING DIE-STOCK.

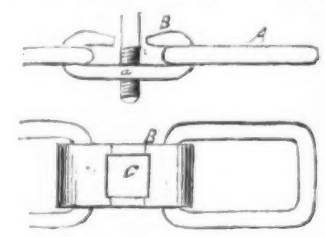
To Andrew Saunders, Yonkers, N. Y.—Nov. 16.—The plain cylindric extension *m*, provided upon the tubular feed screw F, in combination



with the cylindric bearing *g*, provided at the inner end of the socket E, carrying the said feed screw, the whole arranged in relation with the essential working parts of the threading die-stock.

ENDLESS CHAINS FOR HORSE POWER.

To S. W. Davis, Brasher, N. Y.—Nov. 9.—In an endless chain composed of alternate links A and double hook bars B, the nut *a*, formed in the center of the hook-bar, and the bolt C,



screwed through said nut, and projecting far enough between the hooks to lock the links.

A New Nail Machine.

The Youngstown (O.) *Commercial* publishes the following account of a new nail machine in use in that town:

The machine is made entirely of wrought and cast iron and weighs only about fifty pounds. It is without gear wheels, and the entire movements are operated by three cams. The nail plate is fed into a tube, which is revolved half way around, forward and backward, by a strap running over it and operated by two half pulleys. This tube does away with the nippers used in hand feeding, and consequently saves the waste to scrap which is unavoidable with all hand and self feeders hitherto made. This saving is one great feature of the invention. When the nail plate is fed into the tube, which can be done easily, requiring neither skill nor special care, it is caught at the end first inserted by two steel rollers within the tube. These rollers are each about one inch in diameter and are revolved by a ratchet that is moved in, and by a slotted groove. The end of the tube next the cutting knife of the nail machine proper, is flat, and a spring at this point holds the plate firmly in place until cut up.

The machine is so nicely constructed that the peculiar wrist and elbow motion of the hand feeder is given to the tube which holds the plate that is being cut up. The tube is of the length of two ordinary pieces of nail plate, and when charged, that point is first thrown against the cutting knife and a nail is cut. The tube is then drawn backward two or three inches, and revolves half way over; it is again thrust forward to the knife, when a second nail is cut, and again withdrawn, when it revolves backward to its former position; it again drops to the knife, and so on, till the plate has passed between the little steel rollers which are in the center of the tube. Here the machine would cease feeding, with nearly one entire nail plate within the tube, were it not for the fact that the operator places another plate within the upper extremity of the tube, which second plate being caught between the steel rollers before mentioned is drawn forward and downward and pushes the first plate constantly against the knife.

The whole feeder is so swung upon a pivot that it can be turned aside out of the way to permit the workmen to get at the knives which so frequently require grinding.

So simple is this self feeder that one boy can attend to four or six machines.

The city of Birmingham, Eng., has been making some important experiments in matters which are usually considered to be beyond the pale of municipal effort. Last June the corporation bought the Birmingham Gas Works and has since managed them. The gas supplied has been one candle light better than before, and the saving to consumers has been at the rate of £22,000 a year. Moreover, after this month the price per 1000 feet is to be reduced three pence, which will insure a further saving of £30,000 a year. The water works will pass under municipal control within a few weeks. It is a curious fact that in this country the cities should have generally supplied themselves with water, but not with gas. Birmingham is now about to engage in an extensive series of building operations. Unhealthy tenements are to be pulled down by the acre and model ones put up in their stead.

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For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone	10 00
For each additional constituent	2 00
For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal	12 50

or determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore.
For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.
Printed instructions for obtaining proper average samples for analysis furnished upon application.

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For admission, candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plain Trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. The next session begins October 2nd, 1871. The examination for admission will be held on June 23d, and September 29th, 1871. For further information and catalogues, apply to
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Iron.

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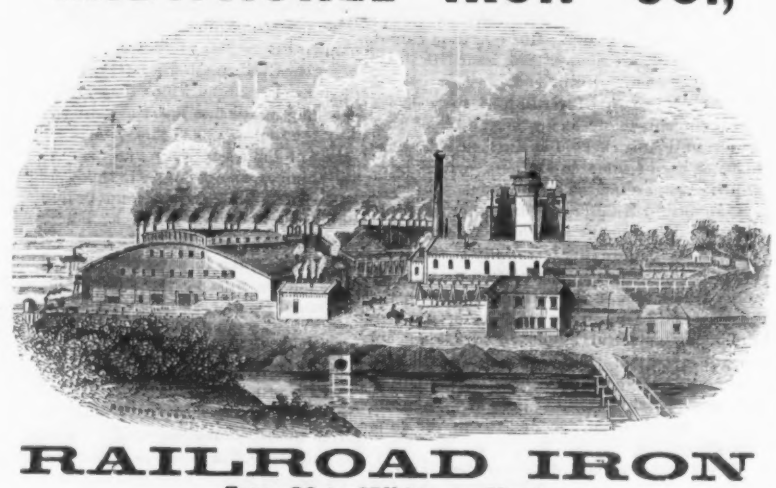

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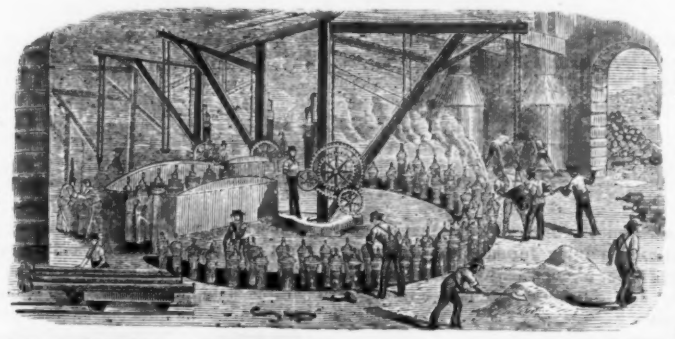

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PART VI.

(Concluded.)

IRON FRONTS.

For building purposes cast iron possesses unequalled advantages of strength, durability, economy and adaptability to ornament and decoration. In resisting any kind of strain it is vastly superior to granite, marble, sandstone or brick. Practically, cast iron is crushing proof, for a column must be ten miles in hight before it will crush itself by its own weight. Unlike wrought iron and steel it is not subject to rapid oxidation and decay by exposure to the atmosphere; and whatever tendency it may have in that direction can easily be prevented by a proper coating of paint. No other material is so valuable after it has served its original purpose, as it may be recast into new forms and adapted to new uses.

In business quarters, where blocks of stores are built up solid, where each building nearly covers the full lot, rear almost butting to rear, with window openings generally only at the front and back, light becomes one of the most important requirements. A light edifice of iron may be safely substituted for the cumbrous structure of other substances, and ample strength secured without the exclusion of daylight. Iron in this respect presents peculiar fitness.

The introducing manufacturers and architects in iron acted on the self-evident proposition that a multiplicity of ornament and decoration could be executed in iron at an expense not to be named in comparison with that of stone, and literally covered their fronts with useless filagree work. Every column was made fluted or of some intricate pattern, every moulding enriched. The carvings high up in the air, on the fifth story, were the same as those low down on the first—no bolder, and in every case too flat and fine. Instead of seeking for beautiful outlines and proportions, and appropriately embellishing special features to contrast with other portions of the edifice purposely left plain and unpretending, ornateness was made the governing idea, and an extreme elaboration produced, with twistings and contortions of outline, and crowding in of small columns and pilasters, and diminutive friezes and cornices, overlaying everything with so-called ornament. Constructors in iron took advantage of the ability of cast iron to resist compression, and of the tensile power of wrought iron, and in an utilitarian spirit produced spider-like structures, suggesting nothing save economy of space and material. Overloading the surface with poorly executed ornament gave their structures a flashy and vulgar appearance. These early stages have been passed, and taste and utility now go hand in hand. For a time the material was judged more from the mistakes of the unskillful than by its capabilities for proper application.

A building should bear the impress of solidity, as though it were indeed a growth of the earth itself, and not of so fragile an appearance that the winds can blow it away. In true architecture the recognition of permanency is one of the true principles of the art. A front must not only be strong enough—it must also possess such an evident reserve of strength, which is the result of obvious abundance. Convenience, permanence and beauty as well as strength are the tests of iron work. And constantly large columns are used where smaller ones would answer. A broad play for light and shadow should be carefully studied. Ornamentation should not be made an end but a mere adjunct. If beautiful outline and proportion be lacking, no amount of meritricious ornamentation can supply the deficiency. Iron affords a cheaper material, a more enduring material, and cleaner and sharper than stone, and it is the best material, all things considered, for the street architecture of our American cities. Whatever moulding is good in stone, for projection or general outline, is also good in iron. If the ancient examples of cornices and capitals, and ornaments generally, which have stood the test of criticism and been judged correct, are deemed best for stone, then they are best for iron also. But correct outlines must be faithfully followed; and can be in the hands of a skillful manufacturer. If error be committed by the unskillful, it no more condemns the material than will the thousands of ludicrous mistakes in wood and stone condemn those materials. The ancients worked in stone, and artistically produced outlines that perhaps never can be rivalled. The principles of architecture, which have endured so long, will remain forever, simply because they embody true taste and common sense, both of which the public have and understand. On the presumption that the public possess no taste, gross incongruities in design are too often put upon the credulity of those who build. Here a great mistake is made. The public eye is a sharp one and demands to be pleased. Whether there is an educated or a natural taste, there is at least *an opinion* to be gratified; and in such cases the majority rules, for, though all do not think alike, a vast number may come to one conclusion, and *that* is generally sure to be correct. Iron is the modern building material, dug from the bowels of the earth, smelted and purified by an advanced science, and ready to supplant stone, just as history relates stone supplanted mud in the construction of dwellings for men. Each tells of a growth in knowledge, applying a better material. Long after a stone front has gone to decay and disappeared, the iron will be retained in its original fullness and sharpness in every line. Keep it painted, and after a thousand years of exposure to the wind and weather, an iron front will be as perfect as on the day of erection.

To paint iron costs much less than to paint wood or other materials, on account of its non-absorbing surface. The *interest* on the difference in first cost between a stone and an iron front will easily pay for one coat of paint a year. More than that—allow the difference in cost to accumulate with legal interest, less the expense of one coat of paint a year, and by the time the stone is ruined the iron will not only have cleared itself and stand on the balance sheet at a profit, but be in prime condition for continued service. On any much traveled street a marble front soon becomes rusty and discolored with dust and rain. An iron front kept properly painted appears periodically in a new dress, and is always clean and bright. Other things being equal, place two merchants respectively in a stone front and an iron front store, side by side, and he in the clean, bright, attractive front will do the most business and can afford to pay the largest rent. A stone front soon becomes discolored and dirty, and shows almost as many different soiled colors as there are different pieces of stone, caused by the chemical ingredients in the stone striking to the surface. An iron front reveals no joints, and looks as though it were cut out of one solid block and of one even color. Every time it is painted it looks new. More than one white marble front now regularly receives a coat of white paint to keep it white, because without the paint they looked dark and dingy alongside of their neighboring white iron fronts.

A great deal has been written about the color to paint iron work. Iron being a material which requires a coating of lead and oil, it is proper to give it any color that good taste may suggest. The color will often be regulated by the color and hue of adjoining buildings or other surroundings. Because marble is white or sandstone brown, the painting of iron work in these colors must not be prohibited. What is to be condemned is the graining of iron in imitation of marble and sanding in imitation of stone. Tints and colors and gilding produce rich and sparkling effects, but great care and exceeding good taste must be exercised or failure will be the result. The best pigments must be used, or the colors, exposed to the air and sun, will fade rapidly—and the best do fade—and leave the front shabby. Wherever practicable, iron work should be painted inside as well as out, without delay. Particular care in this respect should be given to all parts put together in pieces, as cornices, trusses, etc. These should have their joints well painted before being bolted or riveted together. Painting on the inside, however, applies only to the shell parts. Columns cannot be painted on the inside, nor do they need it. Column stands over column with an intervening plate; the very construction makes of the inside of a column an almost air-tight chamber, where the air is always dry and always of one temperature. No oxidation takes place under these conditions, and so no paint is necessary. The inside of a column is covered with a coating of foundry sand, which clings to it for ages. On the shell work, when the paint has fairly reached every crevice, these parts, too, become air-tight, and paint only becomes requisite on the outside, and to brighten up the color. In applying ornaments, such as leaves of capitals, etc, not only should the ornaments themselves be first thoroughly painted, but the screws which fasten the ornament to the main work should be dipped in paint as well. After drilling a hole in iron, the burs around the hole should always be filed away, so that no streaks of rust from rain water down the face of the building, will tell of carelessness in this respect. A lack of care in such little matters often causes the greatest annoyance, and has been the chief reason why iron fronts have had to be painted more often during the ensuing few years of their erection than afterward. Some fronts in a dark color have only been painted for intervals of five years during the past twenty years, and previous to that did not average more than once in two years. For the first coating of iron nothing is superior to oxide of iron mixed with oil, or what is known as metallic paint.

On the manufacturer depends the artistic appearance of an iron building, as well as its durability. The material is capable of receiving the sharpest kind of lines. But to secure under cuttings and that certain crispness necessary to the proper effect, particularly of carved work, requires a combined technical knowledge of architectural detail, of artistic pattern work and of foundry molding, and withal a business pride and reputation. An architect may design a front, but its execution is beyond his control, and its effect, whether very ornate or very plain, may be entirely spoiled by falling into the hands of incompetent mechanics. Between the fronts of today and those erected not many years ago there is a perceptible improvement. The artistic working up of the material is better understood. After years of alterations and comparision, boldness and good proportion in every part has been obtained. The greatest possible caution should be exercised in awarding contracts, and the difference of any moderate sum should never permit the giving of work to parties who are lacking in experience or in knowledge, or in facilities, or who habitually do their work in a slovenly manner, or who are notoriously slow. It is not always to the interest of an owner to give his work to the lowest bidder. The grade of men in the iron business in no wise differ from any other manufacturers, in that there are some whose productions are superior and intrinsically worth more than the like made by others. The thousand items of intricate detail about a job of iron work, which go to make up a complete whole, each of which requires the direct supervision of competent principals, but faintly tells of the constant and unwearying watchfulness that must be given to ensure good results.

Much has been said against iron from misconception. It it is exceedingly difficult in the minds of most writers and talkers who use sweeping denunciations and citations against iron, to separate wrought iron and cast iron in their respective endurance against weather. Wrought iron rapidly oxidizes when exposed to the atmosphere and goes to decay. Cast iron, on the contrary, slowly oxidizes in damp situations; rust does not scale from it, and the oxidation, when formed, is of a much less dangerous kind than on wrought iron. A coating of paint will counteract whatever tendency cast iron has to rust when exposed.

Whatever has been done in iron which deserves censure from critics, can be remedied. Let it not be forgotten that the *material* is not at fault but the *workmanship*. Iron can be made to imitate anything perfectly. Men who have said most against iron have been they who knew the least about it. Arguments have been made that iron is a sham, but a stone building is a greater sham, because it leads one to believe that it is all stone, when, in fact, it is nothing but a veneer set up against a brick wall.

The adaptability of all building materials depends principally upon their property of resisting the destroying influences of the atmospheric air, be these influences either mechanical or chemical. The objection to brown stone for buildings is that it is porous, and rains penetrate it. The water freezes, and in expanding scales off the exterior layer, and a rapid decay is the result. Marble is denser, but every rain storm dissolves a thin film of its surface. A bowl of water collected from the rain that has touched a marble front will be found by chemical test to be so charged with carbonate of lime as to be unfit for purposes for which rain water is required. The effect is that the sharp edges of the architectural details become blunted, and gradually wear away. In marble there is carbonate of iron which absorbs oxygen from the air, and then presents itself in yellowish spots, which gradually turn brown or black. Granite, which is the best building stone in the world, when subjected to strong heat cracks and splits off in flakes and crumbles like dry plaster. Iron for dwellings and churches has the same positive qualities as for stores and banks.

When iron fronts were first introduced it was strenuously asserted by some that expansion and contraction would dislocate the joints and render a building unsafe. An examination of any of the numerous cast iron structures which, for a number of years, have been exposed to every change of atmospheric temperature without, and to the heat of steam boilers, etc., within, will show everything unchanged. This proves that the temperature of our climate throughout its utmost range, from the greatest heat to the greatest cold, exerts upon it no appreciable effect. Events have also proven in the cases of burning of storehouses, filled with combustible goods, that cast iron fronts are absolutely fire-proof, and will neither warp nor crack, nor fall down, unless the entire building falls, pulling the front with it. Only let it be remembered, that, in addition to a high and intense heat, the use of a blast is required to reduce cast iron to a molten state; and the ability of iron fronts to stand heat will be readily understood. They are also perfectly safe during thunder storms; the metal presents so great a mass to the over-charged clouds, so as to become a huge conductor in itself, and silently conveys all the electricity to the earth. In them the intensity current is instantly diffused throughout the entire mass, and changed into a current of quantity, thus obviating all danger from disruptive discharges. Iron fronts have stood erect in cases where the side brick walls were entirely thrown down and demolished by the elements.

A front of iron is usually laid down and fitted together complete in the manufactory previous to erection at the building. It can be transported to any distance to the place of erection, and put together with wonderful rapidity, and at all seasons of the year. It takes up less space than any other material, and so enlarges the interior of a building. When it becomes desirable to tear down the building itself to make way for other improvements, the iron front may be taken to pieces, without injury to any of its parts, and be re-erected elsewhere with the same perfection as at first. Instead of destruction there need be a removal only.

Iron has in its favor unequalled advantages of ornament, strength, lightness of structure, facility of erection, durability, economy, incombustibility and ready renovation. In iron, as in other materials, must ever be observed those undeviating laws of proportion, and rules deduced from a refined analysis of what is suitable in the highest degree to the end proposed. There is not a structure erected anywhere but adds its quantum to the good or bad impressions to be directly stamped upon the public mind. Thus everyone who builds is unwittingly enhancing or deteriorating the taste of the masses, and the aggregate result of this is a thing not to be overestimated. It behooves the general use and careful treatment of a material which allows great architectural effect, in proportion to the outlay of money, than any other. The uses and requirements and values of buildings are changing every day, and iron in its architectural application is to fulfill future requirements such as in the past it has but limitedly supplied. In our new and growing country the dollars saved on one building are required for the erection of another, or for use in railroad or mining, or manufacturing enterprises. It is primarily a duty for every builder to do the most with his money, and the most for art. When the public become thoroughly acquainted with the advantages iron posseses as a building material, it is confidently predicted that for superior buildings of all kinds it will receive a general preference to granite, marble, sand stone or brick.

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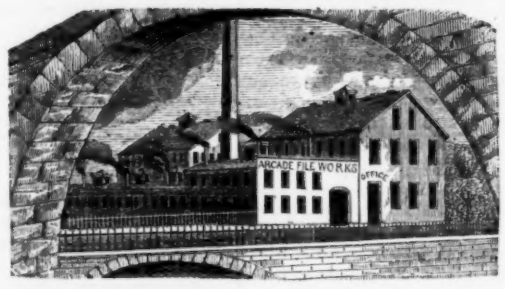

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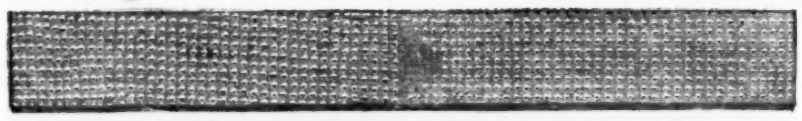

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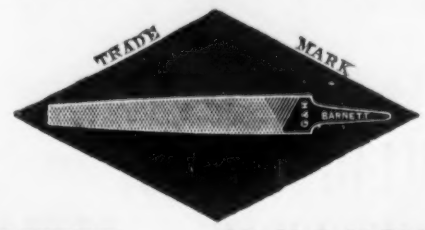

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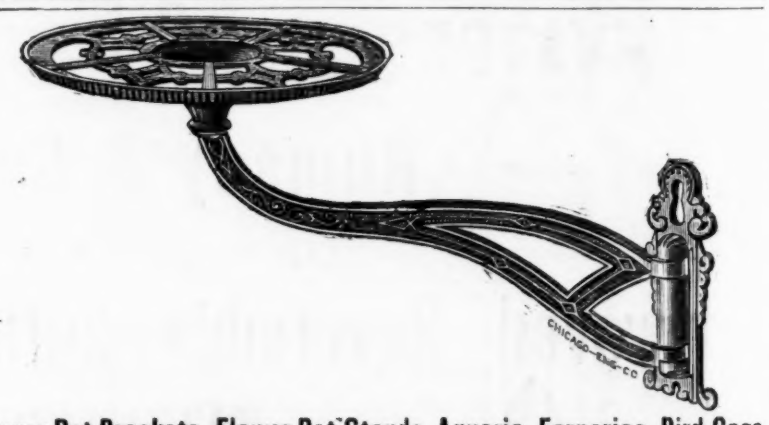

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Taper Steel Rope.

We take the following from the London *Mining Journal* of recent date:

In winding from great depths the rope itself becomes an important item in the total weight to be raised, and as it was necessary at the Adalbert shaft at Przibram, in Bohemia, to draw a load of 112,000 tons per annum from a depth of about 620 fms. (English) in 16 working hours per day, considerable care had to be exercised in making the arrangements, especially as the character of the shaft did not permit of the use of double-decked cages, so that not more than 1 ton could be drawn at one time. To make the 112,000 trips per annum it was necessary to run 20 trips per hour during the whole 350 working days, at a speed of 20 feet per second, including stoppages, or 31 feet per second (over 21 miles an hour) maximum speed. With these data Mr. John Novak proceeded to calculate in detail the form and dimensions of winding gear of different constructions necessary for performing the work. He finds that conical drums with a spiral bed for the round drawing ropes to coil on would have required to be of such large dimensions as to be unmanageable—43 ft. diameter, diminishing to 31 ft., and 30 ft. 7 in. wide. Flat ropes, although showing a slight gain mechanically, had the advantage more than counterbalanced by the increased cost of the rope. Mr. Novak considers that the supposed greater durability of flat as compared with round ropes is to be attributed to the fact that the former are usually of a proportionately heavier section than the latter, and that too small a diameter of drum is often adopted for round ropes. When flat and round ropes are made so as to be strained equally, and the proper diameter of drum is chosen, the latter will certainly wear as long as the former. The experience already derived from the use of round steel wire ropes at Przibram bears out this conclusion, where they are found to stand two years' continuous wear, or more even in one instance. The final selection, therefore, was tapered steel wire rope, of circular section, with a breaking strain of 72·1 tons per square inch, assuming sixfold safety strength in the working strain. The rope was formed throughout of 36 wires, the taper being obtained by reducing the gauge of the wire. The lowest section of 328 ft. was of wire 0·075 in. diameter, and weighed 8 cwts. 5 lbs.; the second length, 590 ft., was of 0·079 in. wire, and weighed 4 cwts. 19 lbs.; the remaining three lengths were each 918 ft. long, the diameter of the wires being 0·088, 0·098 and 0·103 in., and the weight 8 cwts. 16 lbs., 10 cwts. and 11 cwts. 2 lbs. respectively, the whole 3672 ft. weighing 35 cwts. 42 lbs., or only about half the weight of a flat rope of equal strength. The diameter of the drums was determined so as to take the whole of the rope in two thicknesses, as experience showed that the tapered end, when lapped a third time, is liable to become wedged in the hollows between the thicker portions below, which causes the wires to bend and be torn. Of course, the great length precluded the possibility of coiling the rope in a single layer. The final dimensions chosen were 19·7 ft. diameter and 2·75 ft. breadth of face, which, at 72 coils in a double layer, gives a capacity of 4451 ft., or about 790 ft. more than the present requirements.

Experiments proved that the difference between the power required to move the load at the beginning and ending of the journey was not greater than with flat ropes. Supposing a mean speed of 20·4 ft. per second, or 20 revolutions per minute, and 54 horse-power for engine resistance, &c., and the difference in drawing from a depth of 1120 meters was 298 horse-power; from 1000 meters, 258 horse-power; from 800 meters, 193 horse-power; from 600 meters, 135 horse power; and from 400 meters, 83 horse-power. The conclusions to be drawn from the experiments are: 1. That it is not desirable, in winding from depths exceeding 2300 ft., when only a light load is drawn, to use flat ropes, as any slight equalization of balance obtainable is not in proportion to the extra cost. 2. Spiral rope drums cannot be used for great depths, as they must be so large and heavy that the power saved by the counterbalancing of the ropes is lost by the increased friction on the bearings. 3. For shafts of 1300 ft. and less flat ropes are not to be recommended, as with a tapered round steel rope at such depths no counterbalancing of the ropes is necessary. 4. For shafts between 1300 ft. and 2300 ft. deep, where a heavy load has to be drawn, flat ropes may be advantageously used, especially if the principal workings are at the lowest point in the shaft. For these dimensions, however, spiral drums are expressly suited, as they may be made of reasonable size, allow for a perfect counterpoise of the ropes, and are also better protected against wear than plain drums. The engines adopted were horizontal and direct acting. The cylinders are 20·8 in. diameter, with a length of stroke of 6·6 ft. The steam pressure on the boiler was 7½ atmospheres, and the initial pressure on the piston 6⅓ atmospheres, the maximum duty of 300 net horse-power being attained with the cylinders ⅗ full, and 20 revolutions per minute. The mean duty of about 130 horse-power is attained with a steam admission of 1-5th of the stroke. A modification of Meyer's expansion gear is used, the reversing is effected by Gooch's link motions, and the movement of the expansion slides by special eccentrics. With the exception of the pistons, which are of wrought iron, all the moving parts of the engines are of Bessemer steel. The main shaft is about 15 in. in diameter and 15 ft. long. The drums are made with 12 radial wrought iron arms of a —— section and cast iron seatings. The rims are of wrought iron, with a wooden bed for the rope, the sides being braced together by diagonal intersecting ties. The reversal of the movement is effected by the water pressure engine acting directly on the link motions, about ¾ horse-power being sufficient to pull over the links when making 20 revolutions per minute. For ordinary working a steam break is provided which can also be operated by hand if necessary. The engines, which were constructed by the Prague Engine Building Company, work more economically than similar engines already in use at Przibram, in which the expansion is effected by slides and link motion alone, the relative consumption of fuel being in the proportion of 7 to 10.

Outrages in the Coal Regions.—The Philadelphia *Evening Telegraph* makes the following remarks, with which we perfectly agree, upon the subject of the recent outrages in the coal regions: "The startling murders recently perpetrated in Mahanoy City by a band of masked assassins were unfortunately preceded by many atrocities of a similar character in the same region. It has been infested for years by bands organized for the purpose of committing arson and murder, and protecting incendiaries and murderers from arrest and conviction, the main objects of these crimes being the attainment of unchecked control over mining property, through terrorism and the gratification of private vengeance. The laws have been so powerless to protect peaceable citizens that counter organizations, in the nature of vigilance committees, have occasionally been formed; and, in some instances, the fact that their operations were designed to protect society may not have prevented them from being as sanguinary and lawless as some of the deeds of the Molly Maguires. A remedy for this disgraceful and disasterous condition of affairs should speedily be provided. The Commonwealth should no longer blind her eyes to the fact that she bears within her bosom organized bodies more brutal, dangerous and disastrous than the Kuklux clans of any district in the Southern States ever were, and that the ordinary agencies for detecting, arresting and punishing them are insufficient. A large proportion of violent and destructive demonstrations made during any of the coal strikes in Schuylkill county can be traced to the Molly Maguires, and at all time they are objects of dread and danger. The evil is one of long standing, intensified by the repeated failure of efforts to convict members of the formidable gang, either in the courts of Schuylkill or other counties; and special action or provision is needed to meet the extraordinary emergency. If a system analogous to that applied to the Kuklux by the United States government is adopted by the State authorities, it will be more likely to break up the organization of the Mahanoy assassins and incendiaries, and their confederates, than any method hitherto tried."

Seven years ago at Tilt Cove, a little fishing hamlet near Cape John, Newfoundland, the first discovery of copper was made. Since that time the mine has been worked with success by two capitalists, Messrs. Bennett and McKay, and now the dozen of huts have become a village of 1200 souls, and the mine itself is valued at from $800,000 to $1,000,000, gold. The yield has always been large, and is constantly increasing, and an additional value has been added to the mine by the discovery from time to time of pockets of nickel, and, at last, of a true lode, the value being estimated at from $400 to $1000 per ton. Encouraged by the success of this mine, a Mr. Ellerhausen, a German capitalist, with a practical knowledge of mining, purchased a considerable tract of land at Bett's Cove, a few miles to the southward, and, though he has only been at work one season, he has already shipped to Swansea ore valued at $360,000. Mr. Ellerhausen employs 400 men, and has built up in six months a village of 800 souls in a place previously unpopulated. Two smelting furnaces are in course of erection, and as a corps of trained engineers have been imported, for whose use a prospecting steamer has been built, there is every probability that operations will next year be conducted on a much larger scale. These successful experiments only point the way to the establishment of a great mining interest on the shores of the Bay of Notre Dame, a region where, if geology tells the truth, rich mineral deposits are to be found. The serpentine rocks have there a wide range of distribution. There are frequent repetitions in folds of the same strata bringing up beds of copper, while steatites as often occur exhibiting ores of nickel. As the land thereabout is well fitted for agricultural purposes, and heavily timbered with pine, mining is remarkably facilitated. With hardly an exception Nova Scotia capitalists have affected but one investment—the fisheries—an investment where competition is much keener, and a profitable return by no means as certain. These mines, especially in view of the nearness to the place of consumption, the cheapness of labor and the practical absence of competition, seem to offer, for at least some time to come, a profitable field for the operations of Eastern capitalists.

Accumulating Hydrostatic Pressure.—According to the invention of Mr. Louis Mesdach (of Messrs. Oescher, Mesdach, and Co.), of Paris an accumulator is constructed with the cylinder and plunger inverted, the plunger being fixed on a pedestal foundation, while the cylinder moves up and down over the upper end thereof. The loaded tank is formed with its bottom bulged up to a considerable extent, being thus in great part of annular form, and it is suspended from the lower end of the cylinder by the central part of the bulged up bottom, so that the center of gravity of the tank is always below its point of suspension, and the use of guides is thus dispensed with. Manholes are provided through the annular part of the tank to gain access to the packing of the cylinder.

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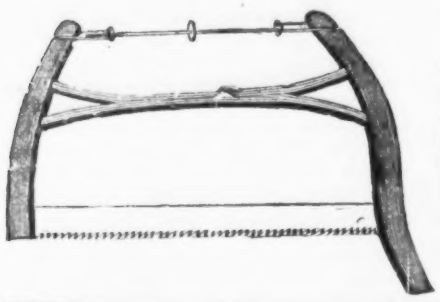

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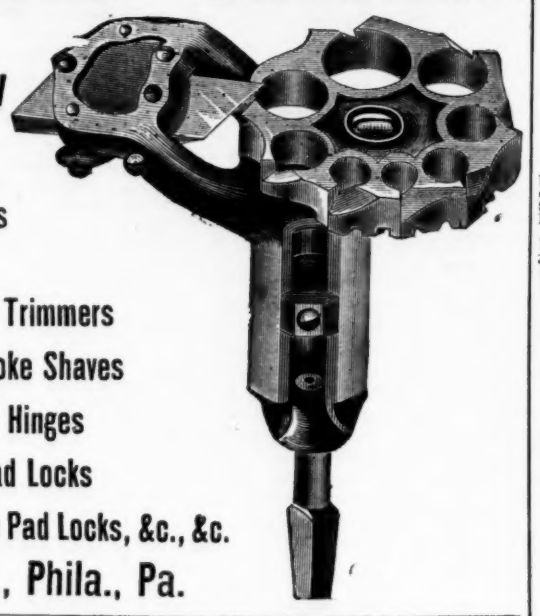

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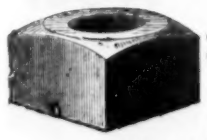

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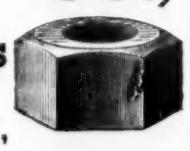

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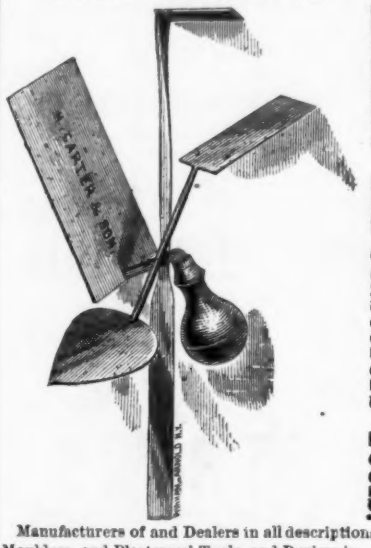

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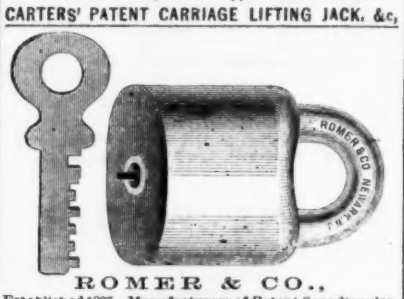

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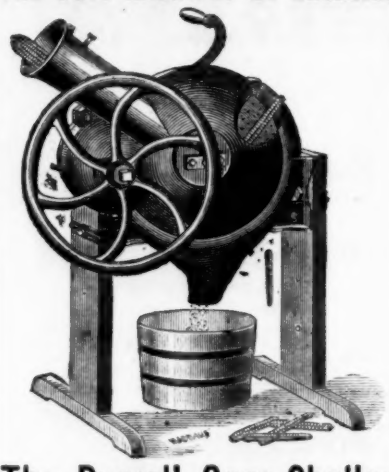

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It has *Wooden* instead of *Iron* Legs, which are not so liable to break. It is made of the best materials and in the best manner. Is strong, durable, and not liable to break in shipping or use. It stands firm while in use. The improved spring plate causes it to shell the largest and smallest as well as undried ears perfectly, *and separates the cobs from the shelled corn.* **List Price, $12·00.** Repairs for Burrall Shellers with Iron Legs Manufactured by

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Evenness of Temper.—The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.

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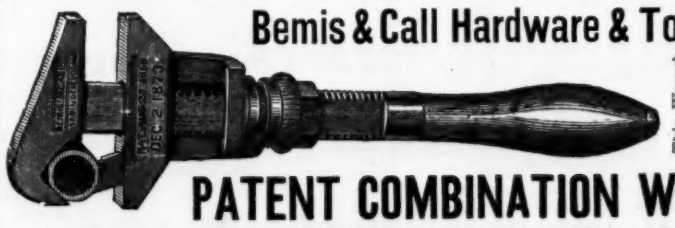

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PHILADELPHIA CORRESPONDENCE.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Dec. 28, 1875.

The prospects in the mining districts of Pennsylvania, with the immense interests dependent upon them, are far from being satisfactory, and the hopes entertained some time ago, of a general revival of trade, appear at present unlikely to be realized. The collieries in the Schuylkill region shut down on the 18th instant, throwing some 15,000 men out of employment, and depriving, probably, 40,000 people of their means of subsistence. In the Wyoming district it is officially announced that work in the collieries will cease on Friday, the 30th instant; the cause assigned—over production. It is feared, however, that the suspension may continue 60 or 90 days. The number of men thrown out of employment will be about the same as in the Schuylkill district, viz., 15,000. In the Lehigh region it is probable there will be no suspension, but work will be continued as at present, from half to three-quarters time.

In the iron trade there is still a very dull prospect, though some firms express a more hopeful feeling, inquiries are more numerous, and it is thought some heavy contracts, which are now pending, will shortly be consummated.

The shipbuilding trade is very quiet, and the anticipations of renewed activity which were recently expressed seem to have been lost. This, perhaps, is in a measure owing to the injunction granted against the Panama Railway Co., forbidding them to build or operate a line of steamships. Arrangements had been made here to build several first-class vessels, but the injunction having been made permanent, the contracts had to be cancelled. An elegant steamship, the St. Paul, built by Messrs Wm. Cramp & Sons, leaves here to-day for San Francisco. She is one of the most symmetrical and handsome vessels that ever left this port, and reflects the highest credit upon her builders. The St. Paul was built for the Alaska Commercial Co., and is to be engaged in the fur trade between Alaska and California. She is 205 feet long, 31 feet beam, 16 feet depth of hold, 1100 tons burthen, and cost about $150,000.

In the tool trade there is a decidedly better feeling; orders are coming in freely, and confidence is expressed that the long looked for reaction is already at hand. Messrs. Henry Disston & Sons report an active trade, and are now employing 1000 men full time. As an evidence of the improved feeling we are informed that they have received more orders within the past thirty days for some descriptions of goods than for any ninety preceding days in this year, and the prospect is considered very encouraging for the future.

The Baldwin Locomotive Works are busy on South American orders, and are likely to be so engaged until spring; they are employing now, as for some time past, 1000 men on full time. There is very little doing for our own railways, but it is reasonable to suppose that a good deal of new rolling stock will be required soon, as very little has been done in that line since 1873. This company has recently finished a street car, to be propelled by steam power, which, if it does not entirely solve the question of rapid transit, bids fair to result in some improvement upon horse-power. The entire cost is estimated to be about the same as an ordinary car, including the horses necessary to keep it in operation. The trials that have already been made are considered entirely satisfactory, reducing the time about 20 minutes, on a round trip of eight miles, and it is confidently believed they will largely supersede the cars now in use, both on account of their convenience and economy of working.

The Market street bridge was opened to the public on Christmas day, having been finished in three weeks, one week less than the time specified in the contract. It should be a matter of congratulation to our citizens that this work was undertaken and carried out so promptly and successfully by Thos. A. Scott, Esq., of the Pennsylvania Railroad Company. At the time the bridge was destroyed it was regarded as a calamity to the whole city, and the most sanguine scarcely hoped to see it replaced before midsummer, and at a cost greatly in excess of the present outlay. This is intended to be only a temporary structure, but in the meantime it answers all the requirements of trade, and is a great convenience.

The Water Supply of Virginia City, Nevada.

The Virginia (Nev.) *Territorial Enterprise* published the following interesting account of the introduction of water into Virginia City:

The success of the Virginia and Gold Hill Water Company in laying another wrought iron main over the Washoe Mountains calls for special notice. It is now about two years since the company first projected and first put into active force their first great effort in putting down a wrought iron riveted (12-inch diameter) main across the Washoe Mountains and valleys intervening. At that time we drew attention to this success in our columns, and to show the wide-spread interest and wonder it excited our article was copied and commented upon in every engineering and scientific paper throughout this continent and the continent of Europe, being regarded, and rightly so, as the greatest triumph of engineering skill known to fame; and for the information of our readers we will again sketch the outlines of this magnificent undertaking and the apparently insurmountable obstacles by which it was surrounded. The water supply is derived from Dall's Creek up in the Sierra Mountains, near Lake Tahoe, in an 18-inch flume, four miles long, to a spur on the opposite side of the Washoe Valley, at a point which is 2100 feet above the track of the Virginia and Truckee Railroad; thence it flows easterly along the crest and crosses the valley at the Lake View toll gate. It is in conducting the water across this valley and its intervening hights that the great triumph of the Water Company has been achieved. At the spur above mentioned the water is received into the iron pipe and conducted along the crest. The pipe then makes the descent into the valley, crosses it, ascends the opposite side and conducts the water to a hight of 1540 feet above the railroad at Lake View, where it is again taken up by another flume and brought on to the city. The total length of the inverted syphon is about seven miles. The inlet is elevated above the outlet 460 feet, supplying about 2,000,000 of gallons per day. The leading of such a stream across a deep valley is declared to have no parallel in the history of hydraulic engineering. The pressure on the pipe is enormous—estimated at not less than that of a column of water 1730 feet in hight. The line of pipe twists and curves to fit the inequalities of ground, and crosses thirteen deep canons. At the bottom of each depression there is a blow-off cock, for the purpose of removing any sediment; each elevation has an air cock, also. The water, when received into the pipe from the aqueduct, passes through wire screens, so that it is rendered pure and fit for domestic use. Before being used, each length of pipe is heated to the temperature of 380 degrees, and submerged in a bath of asphaltum and tar, preventing corrosion. Great as was this first triumph, we have to-day to record an achievement far in advance of it. Although directed by the most eminent engineering skill, and manufactured by the most able riveted pipe-makers on the continent, regardless of cost, it was found that the enormous pressure, which no human foresight could anticipate, produced such a strain upon the rivets and lead joints as to require daily expenditures of money and time to repair the breakages constantly occurring. Thirty-five tons of lead were used to make the joints at the beginning, and a constant further expenditure of lead followed to make the joints good. The success of the effort and the increasing demands upon the company's supply led to the results which to-day we chronicle. Having overcome the natural obstacles of mountain hights and valley depths, the engineer of this company (Mr. J. B. Overton) determined to struggle with the mechanical difficulties already referred to. Knowing that lap-welded seamless pipe was made up to six and eight inches, with screwed couplings, for many purposes—such as steam, gas and water—it occurred to him that if seamless lap-welded pipe could be made large enough and strong enough, and with suitable screwed couplings, the trouble of leaking lead joints would be removed, and being perfectly smooth inside, would give the water easier and ampler flow. Relying on his practical judgment, the company sent him with carte blanche directions to scour the Eastern mills and find, if possible, the desired commodity. After a thorough investigation he found that the National Tube Works, of Boston, Mass., were the manufacturers of the size and quality of pipe he required, and were rigging up to make still larger for hydraulic purposes. He also found their patent sleeve coupling to be just the thing he required. After consulting with their engineers, and receiving suggestions from the experiences they had already gained, and stating fully his requirements, he contracted with the company to supply the pipe under guaranty to do all that he required. It was to be ten inch diameter lap welded seamless pipe, 16 feet lengths, screw joints, with patent sleeve couplings, capable of sustaining 800 pounds pressure to the square inch, with bends for curves, etc. As these were supplied our indefatigable fellow townsman began his work with the eyes of every member of his craft upon him. As the work neared completion the curiosity and anxiety increased only to be surpassed by the astonishment and wonder which followed his triumph. The water was at length turned on and ran from end to end at once without interruption and in three days the whole seven miles was perfect. Instead of using 35 tons of lead, as in the first, 120 pounds only were used, and this for safety bands at the bends on a few of the highest points the pipe crossed. There was a larger flow of water from this ten inch seamless lap welded pipe than had flowed from the twelve inch riveted pipe, over the same ground, fed from the same source, with the same pressure and alike in every other circumstance. We congratulate not only ourselves and the Water Company and their enterprising superintendent, but also the National Tube Works, of Boston, Mass., who have greatly aided a new departure in hydraulics and added to their fame as the makers of the finest and largest diameter hydraulic pipe (for they now make it 15 inch) that the Old World or the New has ever seen, and demonstrates the wisdom of the managers of the California Mechanics Fair in giving to the National Tube Works Company a special gold medal for the exhibit made there of this seamless lap welded pipe.

Improvements in Puddlers' Rabbles.—Hitherto puddlers' rabbles and paddles have been made by shearing to the required form pieces of sheet iron, and welding thereto a piece of bar iron to form the shank. To obviate the loss of time and material occasioned by this method of manufacture, Mr. H. Hunting, of Jarrow, would pass the bloom of iron for rabbles through rollers, cut to a suitable form. This operation prepares the iron for the finishing rollers, and forms, in what will be the shank of the tool, one or two grooves for the purpose of affording space for the superabundant metal in the blade being rolled therein by the next process. On the blade of the tool entering the second pair of rollers, the metal is driven from the shoulders into the grooves in the shank. At the proper time they are sawn off from the following tool, and the blade bent at right angle to the shank. Puddlers' paddles he would make in a similar manner, the rollers being cut to suit the altered shape of the tool. Another invention connected with puddling apparatus has been patented by Messrs. Clough & Ridealgh, of Stockton-on-Tees. Their improvement relates to applying the supporting apparatus to turn upon a column mounted over the furnace and to be moved into the desired positions for effecting the desired stirring and agitation of the molten metal. The engine employed is of the type working without fly wheel and having no dead center. The puddling machinery may also be driven direct without the intervention of any rotary motion. The suspension rods for carrying the rabble bar are also formed telescopic.

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We invite the particular attention of the trade to our New Straight Bar Wrench, *widened*, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to *any* strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the *fact*, that in 1869 we made several *important* improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes which were *at once closely* imitated and sold as the *Genuine* Wrench by certain parties who seem to rely upon *our* improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be *good* evidence that we manufacture a superior Wrench, we wish the trade *may not be deceived* on the question of *originality*. Trusting the trade will fully appreciate our *recent* efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped

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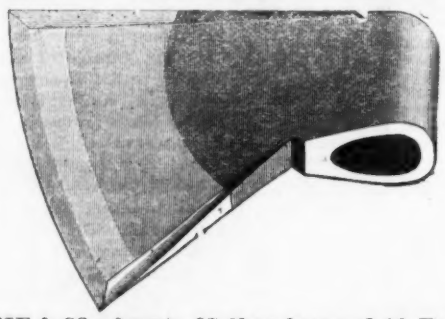

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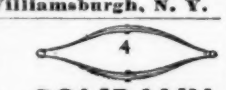

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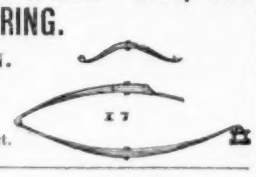

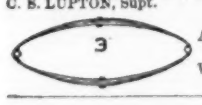

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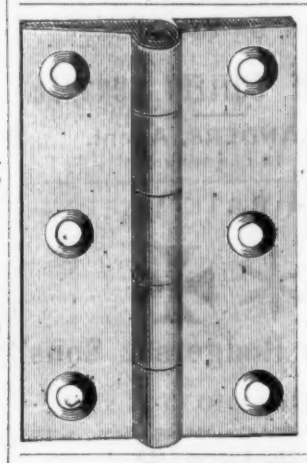

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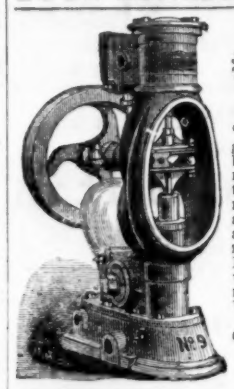

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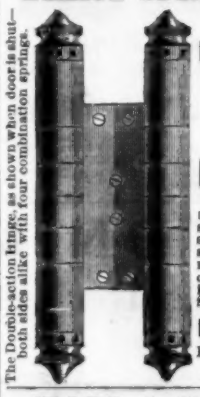

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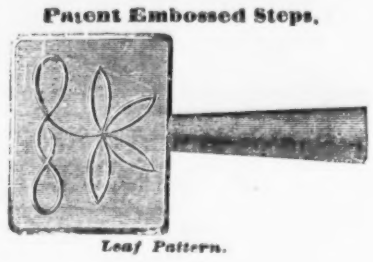
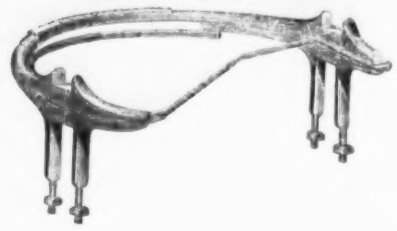
Patent Embossed Steps.



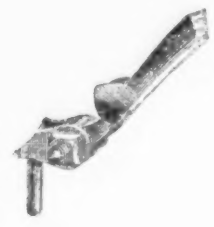
Leaf Pattern.

King Bolt Yokes.

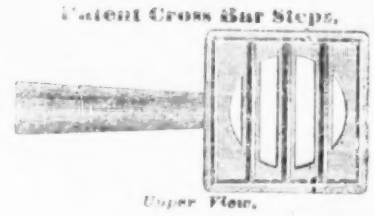
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.

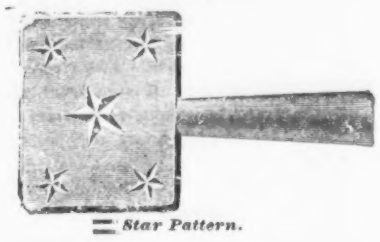


Patent Cross Bar Steps.



Upper View.

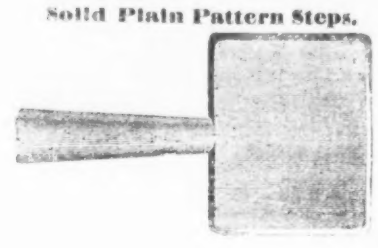
Lower View.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.

Solid Plain Pattern Steps.



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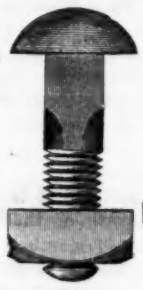

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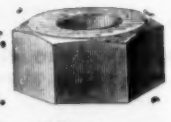

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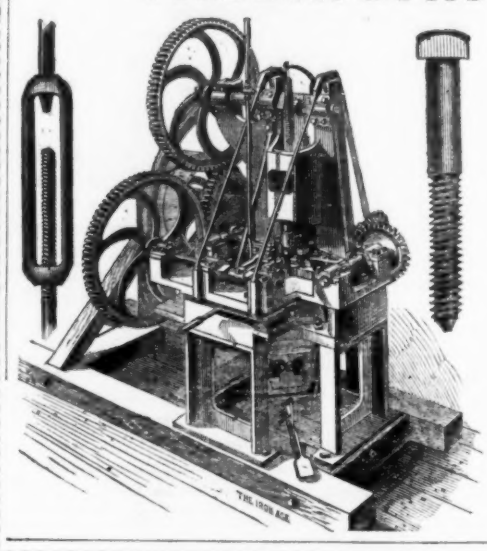

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DAVID WILLIAMS - *Publisher and Proprietor.*
JAMES C. BAYLES - *Editor.*
JOHN S. KING - - *Business Manager.*

NEW YORK, January 2, 1875.

Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents.

Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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City Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*: also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

CONTENTS.

The Past Year.

Few of those connected with the productive and distributive industries of the country will have much occasion to regret, for business reasons, that the year 1875 has come to an end. It has been throughout a year of discouragements and disappointments. With the close of 1874 there were indications of returning confidence, and the hope was generally entertained that the spring of 1875 would bring a decided improvement in the condition and prospects of general trade. This expectation was not to any extent realized. The months have come empty handed, and gone without strengthening the long deferred hope of a substantial industrial revival: and the close of December finds us still hoping that the centennial year on which we are about to enter will bring us larger prosperity than we have enjoyed since the disastrous panic, which paralyzed so many important undertakings and left so many of our great industries prostrate. Whether this hope will be realized cannot now be told. The year will be memorable in many respects. We shall have our Centennial, which should impart a healthy stimulus to trade, and we shall also have the presidential canvass, which experience has shown to make every fourth year a bad one for general business. How these two influences, working in counter directions, will affect manufactures and trade, it would be difficult to predict. The condition of the country is favorable to a good trade, but we do not expect to see the country fairly entered upon an era of uninterrupted prosperity before 1877. The practical settlement of the currency question to the satisfaction of the country at large, will go far toward restoring confidence, and as the business interests of the country are now in a very sound condition, as regards the comparatively small amount of indebtedness between the several branches of trade, next year should bring a change for the better in general business if the disturbing influences before noted do not disappoint the reasonable expectations of our business men.

It must not be supposed, however, that the long season of dullness and depression through which we have passed have brought us no benefit. As a nation we have learned therefrom the important lessons of caution and economy. During the two years which preceded the panic, we crowded everything for the sake of rapid progress and development, and when the panic came it found us carrying too much sail and too little ballast. There was too much expansion in all departments of industry and trade. Our investments were too large in proportion to our reserve capital. We had locked up too large a share of our wealth in ventures depending for their profit upon the continuance of general prosperity, and when the panic came we were practically without resources to fall back upon. From our experiences of the past three years we have learned a larger wisdom than prosperity had taught us, and it will be a long time before we shall forget what we have learned. Another and most important lesson of adversity is the necessity of paying closer attention to the minor economies which, in times of greater prosperity, we are too apt to neglect or disregard. In all branches of manufacture and trade there has been a cutting down of unnecessary expenses, and the decline in prices which has taken place during the past three years has been, to a great extent, rendered possible by the cheapening of production and the lessened cost of distribution. In manufacturing we notice evidences of a greater effort to simplify processes and utilize everything in the shape of by-products and waste for which a value can be found. During the long period of dullness there has been a great deal of work done in the improvement of machinery and in getting ready to resume active operations when the requirements of trade shall warrant, under conditions most favorable to economy. Capital thus spent is well invested. Had more attention been given to improving and cheapening products, and less effort made to expand and increase facilities for manufacturing a large product, our progress during the past twelve years would have been more substantial, even if less rapid.

Another effect of the depression in trade has been to bring down values to very near the specie basis. Every thoughtful person knew that such a decline from "war prices" must come, but it was generally supposed that nothing less than a severe financial panic would effect the change. With the decline in values there has come an important decline in wages. This will benefit all classes of the community, for upon cheap production the industrial future of the country depends in a great degree. Experience is teaching us that there is a definite limit to our industrial development, and that this limit has already been reached for the time being, unless we can make a foreign market for our goods. The home market is of all markets the most desirable, and our manufacturers have fought long and hard to gain and retain control of it; but the home market alone cannot consume all that we have the capacity and skill to produce. During the next few years we shall not probably increase in population in the same ratio as during the decennial period ended with 1870. Immigration has fallen off, principally on account of the advance in wages throughout Europe and the decline in wages here, and if we are to go on developing our industrial resources we must seek consumers for our products in the markets of the world. To compete with England for a liberal share of her export trade, is no longer a formidable undertaking. The changes brought about during the past few years have rendered such competition possible, and our export trade in manufactures promises to increase in volume and profit in proportion to the enterprise of our manufacturers in pushing their way into foreign markets. With lower wages, improved labor saving machinery and vast and varied natural resources, it should not be many years before we shall dispute with England her claim to the title of "workshop of the world."

On another page will be found a carefully prepared review of the course of the metal markets during the past twelve months. The course of iron has been almost steadily downward. At no time has there been any important advance, and the tendency has been steadily toward lower prices, though with no improvement in the demand. In our first issue for the current year we quoted No. 1 Foundry Pig at $25 @ $27; No. 2 Foundry at $23 @ $25, and Gray Forge at $20 @ $23. By the first of April the prospect of a long strike in the Anthracite District advanced these quotations a dollar on each grade. The beginning of the third quarter found No. 1 quoted at $25, No. 2 at $23 and Gray Forge at $20 @ $22. From this point they have declined still further, and with the close of the year we have to quote as follows: No. 1, $23; No. 2, $21; Gray Forge, $19 @ $20. The tendency of prices in the market for manufactured irons has been toward a point below the cost of production, including interest and contingencies, and even with lower wages few manufacturers whose mills are running on merchant bar have made expenses during the past twelve months. The rail mills have also suffered from the depressed condition of the railroad interest, and have found orders difficult to obtain at prices figured on a very close estimate of cost. We cannot say at this time how large a proportion of the mills and furnaces of the country are standing idle, but the total number is certainly very large, and there is nothing in the outlook for the immediate future to encourage any number of proprietors to relight their fires. We hope our review of the year upon which we are now entering, if we are spared to write it, will deal with more cheerful topics than those which occur to mind in a review of the events of 1875; but we are not prophets, and the familiar proverb concerning the weather indications in time of drought, might be paraphrased to read: "All signs fail in time of depression after panic."

Foreign Exhibits at the Centennial.

It will probably be at Philadelphia as it was at Vienna—there will be some agreeable surprises prepared by foreign exhibitors, but a great many disappointments as well. From what is already known, however, we can gain a pretty good idea of what foreign nations propose in the matter of exhibits.

Extraordinary efforts are being made by French exhibitors. In silks, from Lyons, France will, as has been always the case, outstrip all other nations, including China and Japan. But our own exhibition of silks from Paterson and other neighboring cities will, we feel confident, show a near approximation to the French standard. In optical and surgical instruments, cutlery, bronzes, glassware, and the innumerable articles of fashion peculiar to French industry, it will be difficult to compete with that nation. In woolen and cotton goods, though better, and at the same much dearer, mere taste and the delicacy of color in dye and print will not be easily surpassed by competing nations. In wines and oils France will lead the world, although Spain, at Vienna, to a degree superseded the latter.

Spain will make a very decent exhibit for herself and colonies. She has made noteworthy progress in cotton fabrics in the province of Catalonia, and is a consumer of some 200,000 bales of our cotton annually. These Spanish goods are solid and lasting like our own, and the coarse kinds probably the best made in Europe, though not as cheap as we manufacture them. Spain was very nearly supreme in woolen carpets at Vienna, much to the astonishment of the rest of Europe. In leather goods notable progress has been made in that country, and some agreeable surprises in these manufactures are reserved for us. In the natural products of Andalusian soil Spain has gained a wide reputation. These include wines, fruit and oil. Her mineral riches are as extensige as they are varied; her lead, copper and iron ore will form an important part of the exhibit. The productions of Cuba, Porto Rico and the Phillipine Islands we need not here recapitulate. They will constitute a most brilliant show, and so will the cochineal of the Canary Islands.

Italy will come to us with silks very nearly as handsome as those of Lyons. In the plastic arts she will be without a rival. German industry probably approaches that of France the nearest, especially since Alsace forms a portion of the new empire. Alsace in the manufacture of light muslins and the printing of them, is we believe, unsurpassed in Europe at the present time, this small province alone consuming 200,000 bales of our best cotton in this industry principally. In woolen goods, chemicals, war materials and cutlery, Germany will assume a high rank at the Centennial.

We need not here dwell on the magnificent exhibition which Great Britain will furnish on the occasion. It embraces pretty much all the departments which the Northern Continent and ourselves can put forth. Many surprises will be forthcoming in machinery and new devices of all sorts.

Australia will furnish an exhibition of rare merit. Few minerals exist which are not to be met with in this colony, which is growing rapidly in civilization and active industry. Her wool, metals and gums will form an important part at the exhibition. Almost the same may be said of New Zealand and the Cape Colony.

Belgium, Holland and her colonies, Denmark and Sweden and Norway will come in for an important share. Austria will compete very closely with Germany, and in point of taste outstrip her in many of the ornamental departments, approaching nearer to France in this respect.

Brazil expects to present to us her ruler at the same time, under whom she has attained such a high degree of prosperity in spite of the protracted Paraguayan war. Her exhibit will no doubt be as magnificent as her productions are various. Of the Republics, much may be expected of Mexico, whose dexterity in working the precious metals and the embroidering of fine leather, has gained her an acknowledged reputation. Her mineralogical department will be of great interest. The Argentine Confederation, beside hides and everything derived from the raising of cattle on a scale nowhere surpassed, will exhibit her fine wools so closely competing with those of Australia and the cape.

In the midst of her political troubles, Turkey, together with Egypt and her remaining dependencies will, in all likelihood, make as fine and surprising a show as she did at Vienna, and so will Morocco. The exhibits of the Oriental nations will be curious and interesting, and we shall probably gain from them a better idea than we now have of the wonderful skill of the Mongolian races.

The instruction and the manifold advantages which are to accrue to the people at large from this comparison of productions from all quarters of the habitable globe, cannot be overestimated. In many articles in which we considered ourselves supreme, we shall have to lower our pretensions, while in a great many others we shall have the satisfaction that the goods themselves will proclaim their superiority.

Tin Plates.

We are frequently asked by consumers of tin plates for information concerning them which can best be given by first stating the questions, which are briefly as follows:

1. How can a good quality of tin plate be told from an inferior quality?

2. Are tin plates as well made and heavily coated now as they were a few years ago?

3. What kind of tin plates are best for roofing purposes?

To these questions we reply to the best of our knowledge, gained from observation and inquiry, as follows:

1. A person not accustomed to judging the quality of tin plates, and whose eye is not educated to note the fine points of difference between them, would not, probably, be able to tell the difference between any but the best and poorest plates. There are points of difference, however, which to the educated eye are readily apparent. Hold two plates, one very good and one very poor, in a good light—preferably a north light—at such an angle as to show any inequalities in the surface. It will be noticed, upon careful observation, that the surface of the plate known to be of poor quality is uneven. The tin, though bright, is not of sufficient thickness to cover the iron perfectly, and if minutely examined, preferably through a glass, it will be seen to be full of holes. Why these holes occur can be easily explained. A plate of black iron ready for the tinning, if examined under a microscope of not less than 100 power, will be found to present upon its surface the appearance of a bed of mushrooms. Iron is naturally crystalline in structure, and when rolled out very thin, the points of the crystals, which stand up all over the surface of the sheet are flattened down in much the same way a rivet head is formed in boiler work. The crystals in good iron are very close together, and when flattened, the edges of their surfaces seem to touch; but when examined under a powerful glass, it will be seen that there is an appreciable space between them. Now, when a thin wash of tin is applied in the making of a cheap plate, the process of rolling which immediately follows the immersion of the plate in the bath of molten metal, strips off the tin and leaves the surface imperfectly covered. The little pin holes remaining are a pretty sure indication that the plate is not of good quality. Another cause of noticeable imperfection in tin plates is found in the inferior quality of the iron used. Manufacturers do not hammer the balls sufficiently to purify the iron, and every speck of cinder which, in the subsequent rolling, appears on the surface of the sheet, makes an imperfection in the iron which cannot be perfectly covered by the tin. These cinder blemishes are readily seen after the plate has been tinned, and as the quality of the finished plate bears a very close relation to the quality of iron used, such blemishes may be taken as a proof that the plates are of a low grade, or "wasters" of a medium grade.

The good plate, examined under the same conditions, will show a smooth, even surface, with very few of the pin holes before described and no cinder spots, except, perhaps, in the rejected plates, or wasters. The difference between the good and the poor plates can be more easily detected by the eye than described. When all the points of difference have been carefully noted, two plates of more nearly equal excellence should be compared in the same way. The points of difference will be the same in kind, but less in degree. A little practice of this sort, especially if aided by a pocket lens, or a strong spectacle glass held at the distance from the eye and the surface of the plate which will develop its greatest magnifying power, will enable any person of intelligence to judge with approximate accuracy the quality of a tin plate. We should not, however, advise a consumer of tin plates to rely upon his own judgment solely. The guaranty of a respectable dealer of experience may be accepted with confidence; and a very good plan in buying is to tell the dealer for what use it is intended. Experience in filling similar orders will enable him to judge accurately what grade of tin will best answer the purpose.

2. The bulk of the tin plates sold at the present time is not as good as the bulk of those sold some years ago. Of genuine charcoal plates, very few come to this market. The greater part of the iron used for the so-called charcoal plates is made of charcoal and coke iron welded and worked together. Plates of this kind, while not quite as good as those made from pure charcoal iron, are enough cheaper to make up for any difference which exists between them. Reputable dealers do not claim that ordinary brands of charcoal tin are made of pure charcoal iron, but the fact is not probably known to a majority of consumers. There are in the market to-day tin plates as good as any ever made, and probably better, but the great demand of the trade is for a cheaper article, which is accordingly furnished by the manufacturers. For nineteen-twentieths of the uses for which tin plates are employed, those now made are as good as need be; for the remaining twentieth specially good qualities are easily obtained, if consumers will pay for them what they are worth. In tin plates quality and the price bear a very close relation to each other, and it is idle to expect that a dollar's worth of them, or of any other staple article of merchandise, can be had for 50 or 75 cents. If the buyer will remember this, he will be in little danger of being imposed upon by irresponsible dealers who misrepresent the quality of the plates they offer.

As to the quality of plates best adapted for roofing purposes, we cannot offer any opinion. As there exists a wide diversity of opinion on this subject among practical roofers, we conclude that climate has much to do in determining this point. In some localities, terne plate has been found to answer every purpose and last many years; in other localities common and good grades of coke are preferred, while in still others the roofers cannot recommend anything less than a good grade of charcoal. This is a question which can only be answered by the results of experience.

People often give very bad advice with very good intentions, but it must be confessed that good intentions do not excuse mistakes of this kind. For example, we find in a Western mechanical journal the following paragraph, which, in the cause of humanity, we cannot let pass without protest:

Iron workers frequently get burned while about their work, and we may do them a service in publishing the following from *Hall's Journal of Health*: "On the instant of the accident, plunge the part under cold water. This relieves the pain in a second, and allows all hands to be composed. If the part cannot be kept under water, cover it over with dry flour an inch deep or more. In many instances nothing more is

needed after the flour, simply let it remain until it falls off, when a new skin will be found under. In severe cases, when the part injured is under water, simmer a leek or two in an earthen vessel, with half their bulk in hog's lard, until the leeks are soft, then strain through a muslin rag. This makes a greenish colored ointment, which, when cool, spread thickly on a linen cloth, and apply it to the injured part. If there are blisters, let out the water. When the part becomes feverish and uncomfortable, renew the ointment, and a rapid, painless cure will be the result, if the patient, meanwhile, lives exclusively on fruits, coarse bread and other light, loosening diet."

To plunge a person badly burned into cold water would be most horrible cruelty. In at least one instance of which we have heard, death has come to end the sufferings of the victim thus treated. If warm water or even hot water is at hand, the burned part may be plunged into it with temporary relief; but even for a slight burn not necessarily dangerous, the external application of cold water is an aggravation which retards recovery. In other respects the item is correct enough; yet the teachings of the best authorities on this subject, as well as our own experience, is entirely against the application of grease, fat, or other water proof substances to the skin. Glue, paste, gum arabic, flour, and lather made of soap, are some of the articles used with the greatest success for the treatment of burns, cuts and flesh wounds generally. The application of thick gum water to a burn, covering the part immediately with thin fine tissue paper, we have found to be, by experience, an admirable method of treatment. The paper absorbs any discharge, and the gum, while it excludes the air and dust, does not prevent the secretions from the surface from penetrating it. Commonly with the substances named, a burn heals by first intention, and the usual inflammation and supperation does not take place. Carpenters who have glue constantly at hand use it very successfully for dressing wounds and sores. Paste, and even common mucilage is admirable in connection with soft, clean paper, unsized. It is notorious that where oinments or salves are used, if they are in contact with the flesh for any length of time there is always trouble. One of the great secrets of rapid cure seems to be the protection of the part from the air and the application of a covering which easily absorbs the secretions of the surface.

The Stove Trade.

The course of the stove trade during the past year has been about the same as during 1874. It has been characterized by cautiousness on the part both of manufacturer and dealer. The troubles of 1873 left the retailers with large stocks on hand with which to begin the next year, but they have seemed disposed not to repeat the error. They have bought sparingly, and are inclined to leave on the manufacturer the burden of carrying goods. Purchases have been frequent, but small, and the accounts to be settled in January and February do not represent the usual amount of indebtedness. The quantity of stoves made has not exceeded the demand, and the spring season will probably open with a light stock in the hands of both makers and dealers. Prices have been rather less this year than last, although no formal declaration of this kind has been adopted. An attempt was made in Chicago in January to increase the rate per pound, owing to the high price at which labor had been maintained, but it was not successful. The spring season was very dull, and the market maintained this disposition until September, when a few days of cold weather revived the business, and sales have been good ever since, down to the period of present writing. No great novelties have been introduced, rendering the expense for patterns comparatively light, and the litigation with which the whole trade was at one time threatened has not proved as expensive as was feared. Failures have been of usual frequency, but they have been for small amounts, while the labor market shows a decided tendency to weakening. Ranges have been more in demand in proportion than formerly, while the more elaborate stoves have met with a good reception. It is understood that the Western trade has been better than that of the East.

Transmitting Motive Power.—The machinery invented by Messrs. Goubet and Monrocq, of Paris, differs from that generally employed in the entire suppression of belts and their replacement by steel or iron chains of a particular type or form; in the fitting of the fly-wheel of each machine or tool loosely on its shaft instead of keying it thereto, so as to render the fly-wheel quite independent of the machine, the working of which it regulates at the moment the machine stops, which can thus be done absolutely instantaneously; in the driving of each tool or machine through the intermediation of a spring clutch mounted on the tool or machine shaft, so as to prevent shocks at the time of putting into work; and in the introduction of ratchets on the driving shaft at the point where it transmits the motive-power to the tool with the object of enabling the latter to profit by the sudden motions which accelerations of speed of the prime mover tend to give it.

Dr. Strousberg.

A correspondent of the *Tribune*, writing from Berlin, gives the following account of the career of Dr. Strousberg, which contains some facts of interest in addition to those already given in these columns:

Strousberg is a Polish Jew by birth. I think the paternal signature was Strausberg, but I will not add with positiveness the crime of false spelling to the more serious offenses of which the speculator has since become guilty. The change dates probably from his long residence in London, where the simplest way of writing patronymics is looked on with disfavor. He had an uncle in London possessing some influence in business circles, who helped in many ways and doubtless assisted him in winning his English wife. About 20 years ago Strousberg was sent to Berlin as agent of the Albert Life Insurance Company, and there doubtless learned some of the financial devices that have puzzled more conservative observers. In those days of honest toil he was very poor. Neither he nor his wife had any fortune, and the income from the insurance business seems to have barely kept them from actual want. Suddenly fortune beamed upon them. Some new railways were to be built in Prussia, and the contracts for them were awarded to Thomas Brassey, the great English capitalist. Strousberg, who spoke both English and German, won perhaps by his ability and enterprising spirit the confidence of Brassey, and was made his chief representative and business agent in Prussia. From that time his career was made. His service under Brassey initiated him into railroad enterprises, and enabled him to master the art of securing investments.

The enthusiastic confidence shown by some men and some institutions in Strousberg's enterprises is in curious contrast to the reserve and skepticism of the Bank of Prussia. Up to about one year ago this institution would not take his paper, even indorsed by the two names which its rules require. That the better class of capitalists here always distrusted him, is shown in the comparatively small losses now made known. With the Discount Society, which was, for several years, his chief financial support, he enjoyed unlimited credit; and the authority of that institution may have helped him abroad, where the prudence of German banking was proverbial.

In the various localities where his enterprises were conducted, he seems to have impressed people as an unselfish public benefactor. In Roumania he stood next in honor and dignity to the Prince himself. At Bubna, near Prague, the very peasants were ready up to the moment of the crash to put their small savings at his command. In Moscow, one of the most prosperous and most prudent concerns, the Commercial Bank of Loans, seems practically to have given him the key to its vaults without any check or security whatever. A spieces of fanaticism took away the reason of all who were honored by his promissory notes. The man could borrow millions, while his notes for hundreds were daily protested at Berlin. Strousberg is a short, stout man, active and decided in his manner, giving an impression of talent, energy and power. No one could meet him without being struck by his appearance. The earnestness of his self-assertion, the daring magnificence of his schemes, carried everything before him. At Moscow, where the stockholders of the Commercial Bank were just deciding to throw him overboard, he walked into the room, as Louis XIV. into the Parliament of Paris, and demanded at once a new loan of $1,360,000. He was living at the Hotel Desaix with a suite of retainers, at a cost of $102 per day. When arrested and taken to the debtors' prison he had just $20 available money in his pocket.

Strousberg was what the French call an *Entrepreneur*, the Germans an *Unternehmer*, what we would call an "undertaker," if we had not perverted that word into a limited and wholly grotesque sense. He was a contractor. He built railways, bought and worked mines, founded vast industrial establishments, and took care always to gain money for himself if not for his creditors and associates. Just how large a private fortune he had acquired is not known, for he was always submerged in mortgages and notes. But he managed to oganize and support a costly establishment at Berlin, where his home nominally is, and everything that could be transferred appears to have been made over to his wife. If the newspapers be correct she has acted like a true woman and wife. A mine which she owned in her own name, and which was worth $1,500,000, she sold some time ago, and put the proceeds into her husband's enterprises. Nor was this all. When the crash came she was at their country-seat, Zfirow, near Prague, and she promptly sold her jewels and other treasures, in value nearly $75,000, and sent that money to him. After his arrest, she started at once for Moscow to effect his release. The poor woman, who had just been living in a castle like a princess, was obliged to borrow money to pay her railway fare. It is stated that at the station, where hundreds of men thrown out of work, and many of them ruined by her husbands's catastrophe, were assembled, she was treated with respect and silent sympathy. The incident deserves notice. The devotion of the poor woman to her husband is the one single bright feature in this career of pretense, of swindling and of shame, and it is gratifying to learn that even the rough peasants of Bohemia can appreciate the fact.

After the affair of the Roumanian railways, which threw a temporary cloud over the "philanthropist's" fame, he removed to London. It was even rumored that he had retired from business. They who accepted such a theory knew little of the man's restless nature, for about a year ago he returned, and in a short time was deep in a variety of enterprises. At Bubna, near Prague, as above mentioned, he began a scheme which was brilliant in promises of success. The vicinity furnishes coal, iron and wood in abundance. These are the three principal materials required for the construction of railway cars or "wagons," and when Strousberg issued proposals for stock in a company which should have that object he found plenty of victims. Many people still believe the project had elements of success, but it wanted the element of prudent, not to say honest, management. It was too closely bound up with his other schemes, and when they failed it failed. At Moscow he was building and organizing railways, and was engaged in other works of public improvement. Here again he found plenty of dupes, till the truth was revealed and the crash came.

Three cities are now contending for the satisfaction of punishing their common foe. Moscow has the victim himself, but penniless; Prague has the Bubna property and its debts; Berlin has his house and furniture. The issue of the case must be awaited before the whole truth can be known, but they who are his creditors will doubtless enjoy that honor for an indefinite time. I ought to add, in fairness, that there are men, in no wise connected with Strousberg, who still believe that he is an honest man and even a deserving and useful citizen.

On Molecules.

It is possible to conceive of two states in which matter might exist, and from the times of the ancient Greek philosopher down to the present day, these two states have formed subjects of discussion—indeed, our most modern theory may be said to be merely a greatly improved form of one propounded ages ago by Democritus, and in its essential conception the very opposite of that set forth by Anaxagoras. The latter taught that all matter was incapable of infinite division, while the former held that, after a certain extent of divisibility had been reached, matter could be no longer subdivided, and the small particles arrived at called atoms—literally that which cannot be cut—would be the minutest possible in the universe. This is now the almost universally received theory, and by its aid certain phenomena can be explained, for which upon no other known hypothesis could any explanation be suggested.

The term atom has been exclusively appropriated by the chemist, while the mathematician and physicist have preferred to adopt, or share with him, the word molecule to signify those ultimate constituents of matter upon whose motions and relations depends the various states of all bodies, solid, liquid and gaseous; their temperature, and other properties.

The word particle is also freely made use of as involving no hypothesis, and meaning simply a small part of any body. Molecule has been defined by Maxwell as "the smallest possible portion of a particular substance;" and, again, as "that small portion of the substance which moves as one lump in the motion of agitation."

Every substance is now supposed to be composed of an immense number of molecules, which, even in the solid state, are never entirely at rest, and in the gaseous are in a state of perpetual violent commotion, rushing about in straight lines in all directions with inconceivable rapidity; and it is this perpetual bombardment, as it has been called, by these little particles that explains the known pressure of gas on the walls of any containing vessel, the incessant impact of the molecules producing the effect of one continual pressure just as upon the eye a succession of rapid flashes of light have the effect of one continuous flame. Of course the molecules, although they are supposed to be separated for a very considerable distance from one another, are perpetually meeting and rebounding, and thus their velocity is interfered with, but there is a certain residuum of speed left, resulting in a mean velocity for the whole. This mean velocity indicates also temperature, and, for the same substance at one pressure, the same mean velocity is always accompanied by the same temperature. But every different substance has a mean velocity of its own for a given temerature, and these have all been calculated, such is the extreme nicety with which the hypothesis is being worked out. Taking, for instance, one of the constituents of water—hydrogen—in the form of gas, its mean velocity has been calculated by Joule at over a mile in one second—a speed far greater than anything we have any practical knowledge of—far above that obtained in artillery practice. The exact velocity is 6097 feet per second, at a temperature of 32° Fah., and at the ordinary pressure of the atmosphere. A daring attack has been made upon the actual size of the molecules with a result that has every element of probability in its favor. Taking the theorem of Classius as a basis, Thompson has calculated that a cubic inch of gas contains 10^{23} molecules, *i. e.*, a hundred thousand million, million, million; and he deduced from certain optical phenomena in connection with the thickness of soap bubbles, from the electrical conductivity of metals, and from other considerations, that the diameter of a molecule was about the 1-500,000,000 of an inch.

To convey some idea of the amount of these magnitudes he says: "If we conceive a sphere of water as large as a pea magnified to the size of the earth, each molecule being magnified to the same extent, the magnified structure would be coarser grained than a heap of small lead shot, but less coarse grained than a heap of cricket balls."

It will be observed that we do not specify what gas this is, because a still further development of the theory shows every gas at a given temperature and pressure to contain the same number of molecules, having, however, different weights, and different mean velocities. But—and here comes the means of reducing the theory to a practical issue—the weights and the velocities so counterbalance one another that the resulting energy is the same for every perfect gas. For this argument the perfect equality in size of every molecule of one kind of substance is assumed; that they are so equal is, however, readily proved. Graham has shown how gases can be separated by diffusion through a porous septum; but, if the sizes of the molecules of our gas varied, it would be possible by successive filtrations to get different portions of the gas with molecules of different sizes. The density would then become unequal, and their combining powers different; but whether this separation is looked for in nature or by the hand of man, it cannot be found. Let hydrogen be taken from water, from a hydrocarbon, or from a fallen meteor, its properties, energy and density, are always alike; and so with all gases. A very convincing proof of the molecular state of matter may be found by taking a cubic inch of water, and, by the application of heat, converting it, in a closed vessel of one cubic foot capacity, into steam. It will apparently fill it. Now, if this steam were an expanded solid, it would fill the space entirely to the exclusion of all other matter. Does it so behave? It does not. In the first place the result is little interfered with, whether the air is first exhausted or not; for the steam can be made to fill it, though the air be there; an inch of ether may be added, and its vapor rises and fills the space as though nothing were there; an inch of alcohol could be similarly vaporized as though nothing were present. The same thing could be done with other volatile substances; and we could go on adding liquid after liquid, and evaporating all into the space at one time. This is very striking proof that the liquid in vaporizing has had its particles widely separated, and so left room for other particles to be disseminated within its interstices. This position is still further strengthened by observation of the pressure: each liquid exerts a pressure in itself, and if a suitable apparatus be provided to receive the vaporized products and connected with a barometer, it will be found that the pressure of the mixed vapor is just the sum of that of the individual vapors.

Having now indicated the state of matter in the form of gas, that of liquids and vapors may occupy our attention. In a liquid the various motions of the molecules, vibratory, rotatory and rectilinear, exist in a modified form; the rectilinear is slight, while the other two are not much interfered with. If heat be applied the motion of translation is increased as in gases, and, at certain temperatures, different for most substances, vapor begins to form. Water gives off vapor at all temperatures; but this is not the case with all bodies, mercury, for instance, requiring a temperature above 10° C. before it vaporizes. The dynamical theory of heat explains how this change of state occurs. The molecules being in rapid motion and tossed about in all directions are prevented on all points but the surface of the liquid from escaping; but here they meet with no resistance beyond that mutual attraction which exists among the molecules in the liquid state. But at the surface it will happen that some of them, by a combination of vibratory, rotatory and progressive motions, will be ejected with sufficient energy to carry them out of the sphere of the attractive force of the neighboring molecules, and they then assume the characteristics of gas, moving with the velocity described, and, in this form are truly particles of vapor. If the liquid be enclosed in some vessel, these vapor molecules in their motion of translation will at times strike the surface of the liquid and become imprisoned through the attractive force of the molecules, to be, however, replaced by other projected molecules. This process will continue, and the difference between the number of molecules sent out by the liquid and those caught back again becomes less and less till equilibrium is reached. The vapor is then said to be saturated, and its elasticity under the circumstances, at its greatest point; or, in other words, the vapor exerts its maximum tension at the given temperature and pressure. If, then, we attempt to increase the volume by pressure, a portion will be liquified according to the amount of pressure; but the tension will remain the same. If, however, we pursue the opposite course and endeavor to increase the volume, we shall succeed, and the tension will be lessened; and the more we extend the volume the more exactly do we find it proportional to a reduction of pressure till at last it conforms to Boyle's law, which states that in perfect gases the volume is exactly inversely proportional to the pressure.

But this want of accordance of vapors at their highest state of tension with gases under ordinary conditions of pressure, etc., is more apparent than real, for it is found that the liquefiable gases, such as carbonic acid, nitrous oxyde, etc., when very greatly compressed, also fail to agree with Boyle's law, and act almost the same as vapors. It must not be forgotten that these changes of volume produce important calorific effects, as will readily be imagined when the molecular action is mentally followed. The pressure being now seen to be simply the sum of the energies of a multitude of impacts, it follows that if these impacts take place upon some body that gives way to the shock, the moving force of these molecules will be reduced by just so much as the body gives way to their violence; that is to say, heat or molecular motion will be converted into visible motion. And upon experimental inquiry, such is the case, vapor or gas in expanding loses heat, and if the expansion be great, the cold produced may be most severe. On the other hand, when a gas is compressed, the molecules, instead of losing their velocity, have an additional quantity imparted to them, and the predicted and observed result is a manifestation of heat, *i. e.*, motion is converted into heat. In the production of steam the atmosphere has to be pushed on one side as it were, or the piston has to be forced away from it; here again heat disappears and is rendered latent. So it is through the whole range of nature. Where heat or energy is lost sight of it is not destroyed: it is simply stored up for future use, or converted into motion. Physical energy of every kind—chemical action, electrical action—is converted into heat, and, as Thompson has pointed out, their tendency is continuously in that direction. "There is then in the present state of the known world a tendency toward the conversion of all physical energy into the heat."

Our brief survey of this subject, which possesses such a close and wonderful interest to every student of natural phenomena, may suitably close with a shadowing forth of the result which modern speculation and experiment inevitably lead to, and this we cannot do more explicitly than in the words of Rankine, which we extract from the *Philosophical Magazine*:

"Heat, moreover, tends to diffuse itself uniformly by conduction and radiation until all matter shall have acquired the same temperature."

"There is consequently, Professor Thompson concludes, so far as we understand the present condition of the universe, a tendency toward a state in which all physical energy will be in the state of heat, and that heat so diffused, that all matter will be at the same temperature, so that there will be an end of all physical phenomena.

"Vast as this speculation may seem it appears to be soundly based on experimental data, and to represent truly the state of the universe so far as we know it.—*Engineering.*

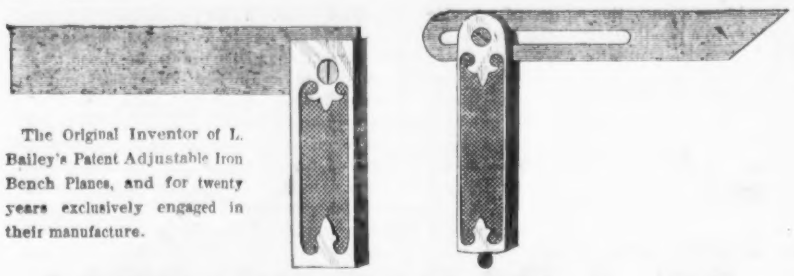
Remarkable American Bronze Work.

The Hartford *Daily Courant* of the 28th says: The Russell & Erwin Manufacturing Company have just added another rich specimen to the already long list of special bronze work cast and finished by them during the last few years. This piece is different in design and purpose from any of the preceding, but is equal to the expectation, of the designer and completely adapted to its purpose, which is to be set as a gate in the family vault of Joseph H. Chadwick, of Boston, president of the Boston Lead Company, located in Forest Hill, the new cemetery near Boston, which rivals Mount Auburn in the beauty of situation and the embellishments of art. Mr. Chadwick has in a lovely portion or this silent but fast growing city of the dead, built a vault of pure Italian marble, elegant and costly. Within this vault is a large room appropriately furnished with chairs and a table for flowers, while the sides of the room are arranged to receive the bodies in crypts one above another. To complete this vault, the architect, W. G. Preston, of Boston, furnished the Russell & Erwin Company designs for a portal of real bronze. In conformity with the designs the work has progressed and been finished. The general style of architecture is Gothic, the gate being a double arch, the lower of ancient and the upper of modern Gothic. Piercing both arches and forming the key of each, is a pillar of the Corinthian order, its capital crowned with the ancient acanthus. Each arch is embellished by open scroll and panel work of chaste design and highly finished. At the point from which on the main outside supporting columns springs the upper arch, are panels on the one side of oak leaves and the other ivy leaves, and immediately over the lower arch is the name—Chadwick. The gate is 8½ feet in hight, 4½ feet in width, 2¼ inches in thickness, and weighs 756 pounds. It will, when in place, swing inward on a heavy bronze castor, thus relieving the hinges from too great strain from such a weight of metal.

Of its kind it is undoubtedly the finest piece of bronze work in this country, and perhaps in the world, and adds to the well-earned reputation of the Russell & Erwin Manufacturing Company for skill in the manufacture of heavy and ornate bronze work. This fine piece of work was in the shipping room yesterday, and was inspected by many, but no one after seeing it was heard to exclaim, with Burke—changing one word—"I would rather sleep in the southern corner of a country churchyard than in the tomb of the Chadwicks."

Apparatine.—A new anti-incrustator has lately been introduced under the name of apparatine, which is prepared by stirring up 16 parts of potato starch in 76 parts of water, and then adding eight parts of potash or soda lye, at 25° Baume, the whole to be thoroughly mixed together. In a short time the mixture forms a thick jelly, and it is then beaten up vigorously for a time, when it forms a colorless, transparent substance, slightly alkaline to the taste, and of a strong glue-like consistency. It dries slowly in the air, without decomposition, and when perfectly dry resembles horn, but is more flexible. When introduced in small quantity into steam boilers, it prevents their incrustation. It is also capable of nearly all the applications of ordinary gelatine, and is especially adapted for sizing textile goods of all kinds, imparting to them a hitherto unattained smoothness. When once applied to goods and dried, it is perfectly insoluble, as three or four washings in hot water have proved to have no effect upon it. It can also be used as a thickening in calico printing. Several of the technical journals speak of this substance as a very important addition to the resources of the dyer and manufacturer. Care must be taken to retain it in air-tight vessels until it is used, as it is not easily rendered soluable again when it has once become hard.

From July 1 to November 10, 1875, official numbers were awarded to 894 vessels, whose carrying capacity amounted to 145,115 tons. Of this number sixty-three were new sea going vessels of 100 tons and over; forty-five of 1000 tons and over; three of 2000 and two of 3000 tons each, with an aggregate tonnage of 100,226 tons.



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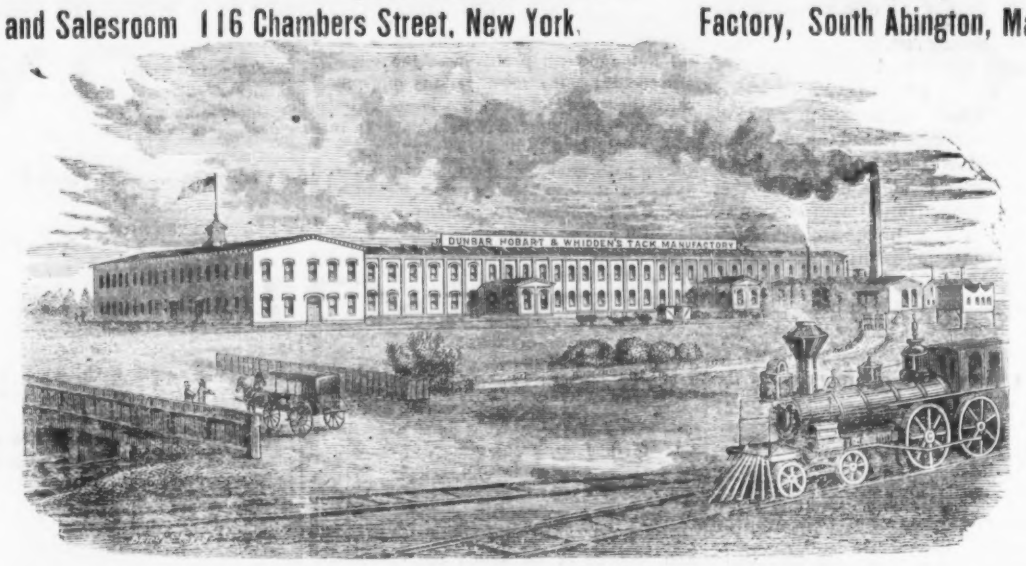

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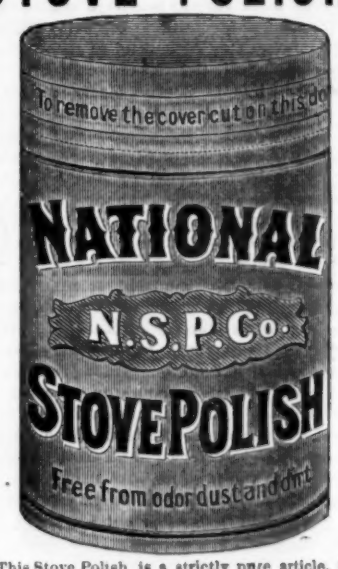

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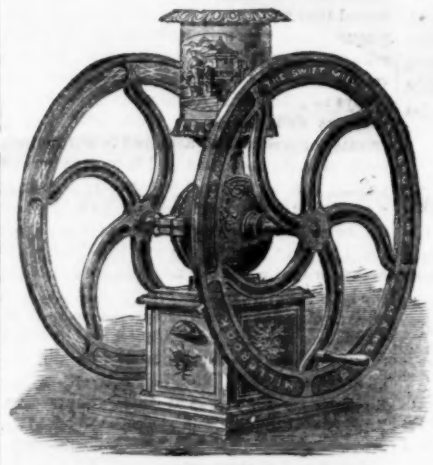


No. 16.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. Silver Medal awarded at the Great Fair of American Institute last autumn. We make more than 30 styles.

ALSO

Lane's Portable Coffee Roaster

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times.

Send for descriptive list.

GENERAL AGENCY:

S. HAVILAND & SON,

259 Pearl St., N. Y.

LANE BROS.,

Millbrook, N. Y.

Also sold by leading wholesale houses.

STAR CHAIN WORKS,

WHITAKER & SKIRM,

Manufacturers of

CHAINS and Chute Nails,

TRENTON, N. J.

Coil Chain.	Car Brake and Safety Chain made to any specified length.	Rake Chain.
Trace Chain.	Special attention given to Chain for Agricultural Machines.	Reel Chain.
Breast Chain.		Drill Chain.
Halter Chain.		Stay Chain.
Cow Ties, &c., &c.		Lock Chain, &c., &c.

GREENFIELD TOOL CO,

Greenfield, Mass.

Sole Manufacturers of the Celebrated

"Diamond" PLANE IRONS,

EXTRA PLATED TABLE CUTLERY. PATENT FORGED OX SHOES. The only Shoe made with **concavity** to fit hoof. **BENCH AND MOULDING PLANES** of every description, &c., &c. **Drop Forgings to order.** Address for Catalogue with stamp.

Two Direct Cutting Edges instead of One Scraping Point.

$1000 Challenge that the Lightning Saw is the Fastest Cutting Saw in the World. It will do more work, day in and day out, and I will back it against any responsible manufacturer.

E. M. BOYNTON,

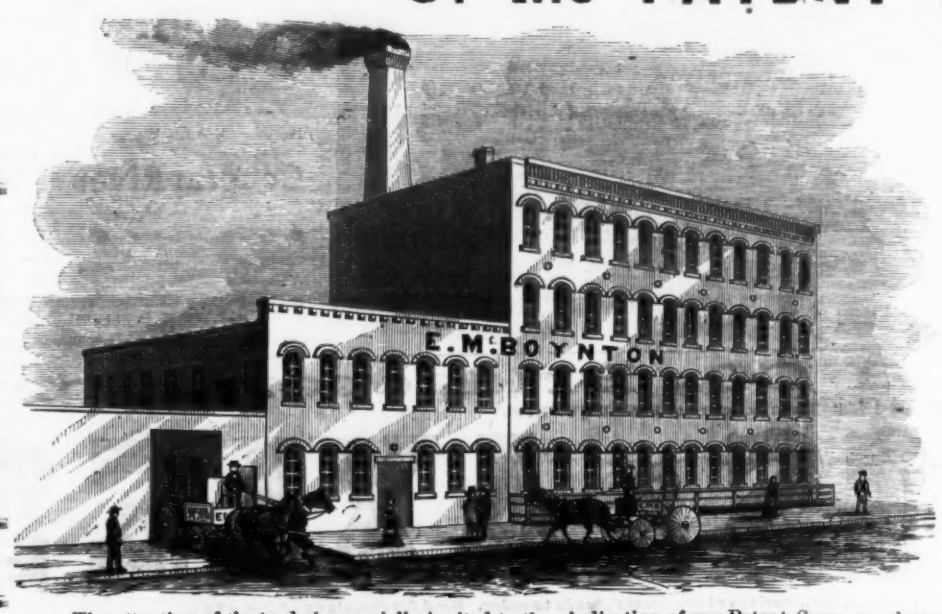
80 Beekman Street, New York.

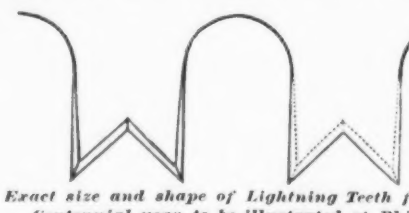
Manufacturer of all Kinds of

First-Class SAWS.

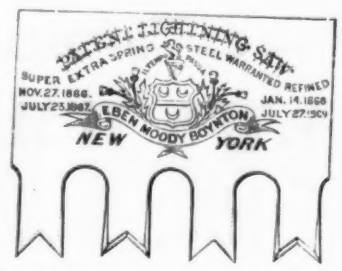
Also, SAW FRAMES, PATENT CROSS-CUT HANDLES, SAW SETS, FILES, and Sole Proprietor

Of the PATENT LIGHTNING SAW.



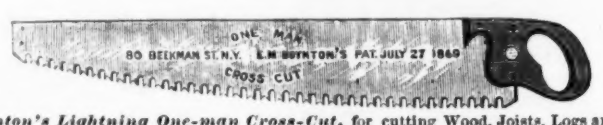


Exact size and shape of Lightning Teeth for the Centennial year, to be illustrated at Philadelphia, Pa., by E. M. Boynton.



The attention of the trade is especially invited to the vindication of my Patent Saws as shown by the published Decree, Injunction and Costs of U. S Court, of September 2d, 1875. In the mean time the other varieties of Clearing Teeth Saws have been overthrown and pronounced invalid. My Patent **M** Teeth alone stand as the only vindicated and protected Patent for Cross Cut and Buck Saw Teeth. I shall proceed at my leisure to make it interesting to infringers, having retained Gen'l Butler and other excellent counsel. ☞ My advice to the trade is to cease selling counterfeits of my goods. I will make any of these imitation goods at prices as low as they can be made, of good material and workmanship, while I will furnish the genuine Patent Lightning Saw at 50c. per foot by the dozen Special terms made with the jobbers and agents for quantity.

Boynton's Patent Lightning Cross-Cut Saw. Price 50c. per foot, Set and Sharpened.



E. M. Boynton's Lightning One-man Cross-Cut, for cutting Wood, Joists, Logs and Timber, and sawing down trees, to which can be attached one of my Patent Adustable Handles, removable at pleasure. Complete, ready for use. *Price, 60c. per foot.* Sizes, 3, 3½, 4, 4½, 5, 5½ and 6 feet. Millions of Axes are in use, where, by using this Saw, half the time would be saved, and no waste of fuel occur.

Frame made of best seasoned stock, and warranted the stiffest adjustable braced frame in the market. Gives universal satisfaction. (30 inch) complete, with Lightning Blades, $8 50 per doz. 100,000 sold and cannot get enough of them made *perfectly* at my own manufactory.

This cut represents the use of my special files, made to fit the angle of the teeth, dressing both points at a single blow, making the saw the simplest and cheapest to file in the world. The shortening of the tooth the thickness of a sheet of paper (which is all any single tooth penetrates) leaves but little dressing necessary. For the undulled edges of the outside of M, the third surface of the file is all that will be needed. They are made 2d cut of highest quality. By the use of this file all difficulty is removed, and the cost of filing Lightning Cross-cut Saws at the factory is two cents per foot; buck saws four cents each. The cost of the 10 inch for cross cuts is $4 20, net, per dozen; 5 inch, for buck saws, half price. A large stock kept constantly at my store in Beekman street.

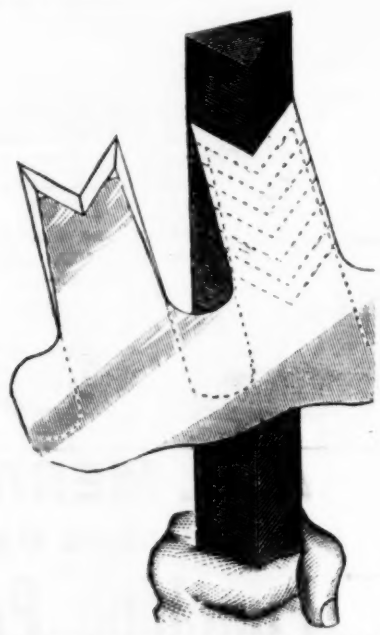
BOYNTON'S PATENT SAW-SET.

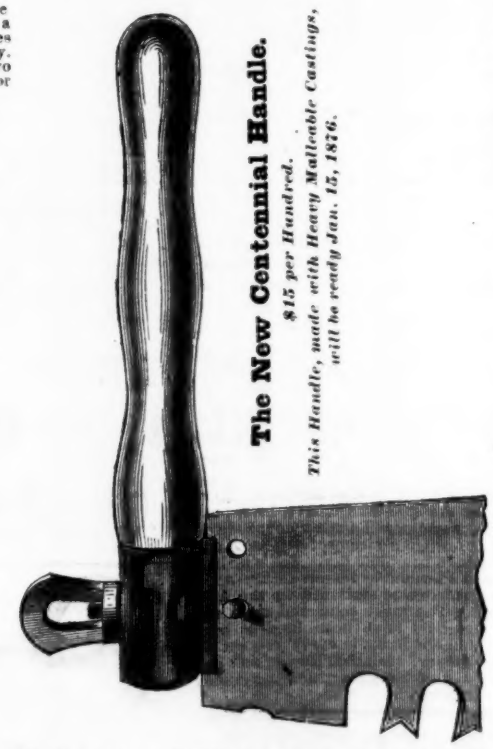
PATENTED NOVEMBER 25, 1873.

Best cross-cut saw-set in the market. A blind man can use it. Sets any kind of a cross-cut saw. Always ready for use; adjusted by a single thumb screw. Can set a saw in field or forest, without any other tools, as well as in a saw shop. No prying, wrenching or hammering in setting, like most other saw-sets.

DIRECTIONS FOR USING.—Simply hold saw in left hand, and then place set on saw tooth, as represented in cut, so as to rest on the gauge, then with right hand bring handles of set together, and the tooth is set. If more set is required, draw gauge back so set can take a deeper hold of tooth. It will also set my Lightning Buck Saw Blades, both points of teeth at once. It has only to be used to be appreciated.

Price, per dozen, $8 40 net; sample sent by mail to dealers on receipt of $1 00.



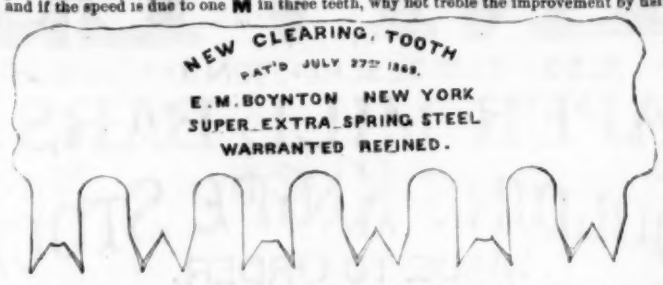


The New Centennial Handle.

$15 per Hundred.

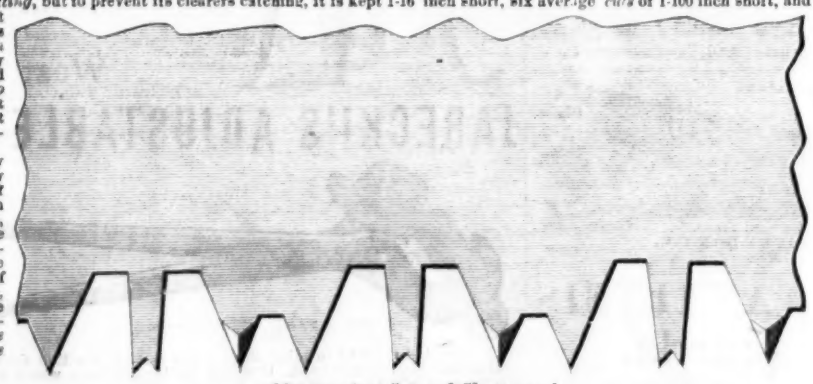
This Handle, made with Heavy Malleable Castings, will be ready Jan. 15, 1876.

My genuine Patent Lightning Saws still lead the American market, and are shipped abroad extensively. No manufacturer dares question this or submit his saws to a public test trial. I offer $500 for expenses. My efforts within a few years have trebled the sale of Cross Cut Saws. While I have prospered, the public have been educated in scientific timber cutting—no small thing when it is asserted that a Billion Dollars is the annual Wood, Lumber and Timber crop of America—four times the value of our wheat crop. The immense waste in cutting wood with axes is almost incredible; any one engaged in cutting cord wood will tell you that the tough and knotty timber and chips are wasted, when they may become good stove wood, if the logs are cut short with my cross-cuts, as blocks of one foot in length are *easily hauled and split.* The savings of timber and time by the scientific use of saws, it is computed, would equal the annual interest on the U. S. public debt *saved*, and the toil of millions of farmers be lightened, if they will only learn to use saws. Every clearing tooth saw has no other *cutting* teeth but the old **V**, and is, therefore, necessarily inferior. It has, however, an **M** shape clearer, and if the speed is due to one **M** in three teeth, why not treble the improvement by using all **M** teeth? A Champion Raker **M** does no *cutting*, but to prevent its clearers catching, it is kept 1-16 inch short, six average *cuts* of 1-100 inch short, and therefore its only mission is to remove dust that may be choking up the arches. As a shovel it is useful; but my Lightning plow teeth, *all of even length*, require no shorting or gauge, clear as they cut simultaneously, which is better than the old process of wearing off timber. *This* is why *no* manufacturer *ever has dared* test publicly against my Lightning Saw, which was awarded the highest *Silver Medal over all competitors* at last American Institute Fair, the same as usual.



This Saw is guaranteed to cut as fast as the Diamond Cross-Cut Saw, and half as fast as the Lightning. Price, 40c. per foot. Filed and Set, made of Best Steel.

The teeth of an ordinary cross-cut saw are usually one inch dust space. If an ordinary log saw has fifty teeth employed in cutting a log, and if a progress of ¼ inch each motion is obtained, the cutting of each point would be 1-50 of ¼ inch, or 1-200 of an inch, the thickness of a very thin sheet of paper. If we allow a cut of double the amount, still but a hundredth of an inch is used. Now, by filing out the middle of my tooth, it is evident the shortening of an average filing will reach up to the undulled edge, which will require but slight edging, thus saving the shape perfectly, and *economizing a square inch instead of the point of steel of other saws, or thrice the durability, without gumming, thus saving files, time and money.*



40c. per foot Set and Sharpened.

Spiegeleisen.—The Chattanooga *Commercial* says: For a number of years past it has been very evident that the manufacture of iron must change in its nature, and the attention of iron men be turned more and more to the manufacture of steel, or, rather, to the production of iron that is susceptible of being converted into steel. Parties who have been interested in furnaces and in iron lands have realized this fact, and have been on the lookout for ores that can be used in the making of spiegel. What has called our attention to this now is the receipt in this city of some of the finest specimens of spiegel iron that we think we have ever seen. They were sent to Mr. S. B. Lowe by the Woodstock Iron Company, for the purpose of showing that spiegel can be made in some places as well as others. The Woodstock Iron Company have upon their property a very large and fine bed of ore that they find entirely available for use in the making of spiegel iron, and we believe it is their intention to turn their attention almost exclusively to the production of this kind, as it is an article of greater commercial value than the common pig iron. There are two other furnaces that will soon turn their attention to the production of this metal. Their experiments thus far have been of the most flattering kind. When their operations are sufficiently advanced to fully test the availability of their ores for "spiegel," we will report their progress. During the past week the inquiry for iron has been rather better than at any previous time within the last six weeks. Our metals are gaining a reputation among the foundries and mills of the West that older established districts might well envy. The fact is that our district produces to-day a greater variety of metals than any other in the United States. The very best of the charcoal cold blast for car wheels is being produced; in fact, some of the best wheel foundries of the West are obtaining their regular supplies from here, deeming our grades better and cheaper. We are also producing large quantities for forge purposes. This is being carried on right in the very face of an average of $5 per ton for transportation against us. If these facts exist now, what may we look for when iron "is itself again?"

A large force of men has of late been busy in the Brooklyn Navy Yard building a new man-of-war. The new system of iron plating has been discarded in her construction, and she is built entirely of the best live oak timber. Her prow, however, will be plated with an immense mass of steel projecting out some 17 feet, and forming a most formidable means of offense or defense. She is named the Trenton, and will be launched on the 1st of January. Old experts say that she is the finest specimen of naval architecture ever built in the Brooklyn Navy Yard, and is a model of symmetry and strength. Her armament will consist of twenty-four 11-inch pivot guns, which will be located on her middle decks, while on the spar or upper deck will be placed two rifle guns, capable of throwing 200-pound shot a great distance with telling effect. She will be furnished with a screw capable of propelling her at the rate of 13 miles an hour, exclusive of her sailing qualities. She will be shipped rigged, having three masts, and will carry a cloud of canvass. Her machinery and engines are being built by John Roach, and will embrace every modern invention. She measures 253 feet in length, 48 feet breadth of beam and 28 feet depth of hold. Her tonnage, by actual measurement, is 2300. She was built under the supervision and from the plans of Samuel H. Pook, the naval constructor, and will be ready to go into commission by the 1st of April at the farthest. Her keel was laid on the 28th of October, 1873, but work on her was suspended almost completely until last July, when a strong force of men was put at work to complete her. She will be one of the most formidable vessels in the service, and will probable be stationed on the Atlantic seaboard. The most solid and massive timber and materials have been used in her construction, and she looks in every respect a first-class man-of-war. Admiral Rowan will be present on the day of launching, and the event will be interesting and important.

The Origin and Progress of Engineering Science.

We give below a condensation of the extremely interesting and valuable address of Sir John Hawkshaw before the British Association. We had hoped to publish it sooner, but its inconvenient length has prevented our doing so. It will repay the careful perusal which we invite for it:

Rapid as has been the growth of knowledge and skill as applied to the art of the engineer during the last century, we must, if we would trace its origin, seek far back among the earliest evidences of civilization.

In early times, when unsettled communities were few and isolated, the opportunities for the interchange of knowledge were scanty or wanting altogether. Often the slow accumulated results of the experience of the wisest heads and the most skillful hands of a community were lost on its downfall. Inventions of one period were lost and found again. Many a patient investigator has puzzled his brain in trying to solve a problem which had yielded to a more fortunate laborer in the same field some centuries before.

The ancient Egyptians had a knowledge of metallurgy, much of which was lost during the years of decline which followed the golden age of their civilization. The art of casting bronze over iron was known to the Assyrians, though it has only lately been introduced into modern metallurgy; and patents were granted in 1609 for processes connected with the manufacture of glass, which had been practiced centuries before. An inventor in the reign of Tiberius devised a method of producing flexible glass, but the manufactory of the artist was totally destroyed, we are told, in order to prevent the manufacture of copper, silver and gold from becoming depreciated.

Again and again engineers as well as others have made mistakes from not knowing what those had done who have gone before them, and have had the same difficulties to contend with. In the long discussion which took place as to the practicability of making the Suez Canal, an early objection was brought against it that there was a difference of 32½ feet between the level of the Red Sea and that of the Mediterranean. Laplace at once declared that such could not be the case, for the mean level of the sea was the same on all parts of the globe. Centuries before the time of Laplace the same objection had been raised against a project for joining the waters of these two seas. According to the old Greek and Roman historians, it was a fear of flooding Egypt with the waters of the Red Sea that made Darius, and in later times again Ptolemy, hesitate to open the canal between Suez and the Nile. Yet this canal was made, and was in use some centuries before the time of Darius.

Strabo tells us that the same objection that the adjoining seas were of different levels, was made by his engineers to Demetrius, who wished to cut a canal through the Isthmus of Corinth some two thousand years ago. But Strabo dismisses at once this idea of a difference of level, agreeing with Archimedes that the force of gravity spreads the sea equally over the earth. When knowledge in its higher branches was confined to a few, those who possessed it were often called upon to perform many and various services for the communities to which they belonged; and we find mathematicians and astronomers, painters and sculptors, and priests called upon to perform the duties which now pertain to the profession of the architect and the engineer. And as soon as civilization had advanced so far as to admit of the accumulation of wealth and power, then kings and rulers sought to add to their glory while living by the erection of magnificent dwelling palaces, and to provide for their aggrandizement after death by the construction of costly tombs and temples. Accordingly we soon find men of ability and learning devoting a great part of their time to building and architecture, and the post of architect became one of honor and profit. In one of the most ancient quarries of Egypt a royal high architect of the dynasty of the Psammetici has left his pedigree sculptured on the rock, extending back for twenty-three generations, all of whom held the same post in succession in connection with considerable sacerdotal offices.

As there were in these remote times officers whose duty it was to design and construct, so also there were those whose duty it was to maintain and repair the royal palaces and temples. In Assyria, 700 years before our era, as we know from a tablet found in the palace of Sennacherib by Mr. Smith, there was an officer whose title was the Master of Works. The tablet I allude to is inscribed with a petition to the king from an officer in charge of a palace, requesting that the master of works may be sent to attend to some repairs which were much needed at the time.

Under the Roman Empire there was almost as great a division of labor in connection with building and design as now exists. The great works of that period were executed and maintained by an army of officers and workmen, who had special duties assigned to each of them.

Passing by those early attempts at design and construction which supplied the mere wants of the individual and the household, it is to the East that we must turn if we would find the earliest works which display a knowledge of engineering. Whether the knowledge of engineering, if we may so call it, possessed by the people of Chaldæa and Babylonia was of native growth or was borrowed from Egypt is, perhaps, a question which cannot yet be answered. Both people were agricultural, dwelling on fertile plains, intersected by great rivers, with a soil requiring water only to enable it to bring forth inexhaustible crops. Similar circumstances would create similar wants, and stimulate to action similar faculties to satisfy them. Apart from the question of priority of knowledge, we know that at a very early period, some 4000 or 5000 years ago, at least, there were men in Mesopotamia and Egypt who possessed considerable mechanical knowledge, and no little skill in hydraulic engineering. Of the men themselves we know little; happily, works often remain when the names of those who conceived and executed them have long been forgotten.

It has been said that architecture had its origin not only in nature, but in religion; and if we regard the earliest works which required mechanical knowledge and skill, the same may be said of engineering. The largest stones were chosen for sacred buildings, that they might be more enduring as well as more imposing, thereby calling for improvement and invention of mechanical contrivances, to assist in transporting and elevating them to the position they were to occupy; for the same reason the hardest and most costly materials were chosen, calling for further improvement in the metal forming the tools required to work them. The working of metals was further perfected in making images of the gods, and in adorning with the more precious and ornamental sorts the interior and even external parts of their shrines.

The earliest buildings of stone to which we can assign a date with any approach to accuracy, are the pyramids of Gizeh. To their builders they were sacred buildings, even more sacred than their temples or temple palaces. They were built to preserve the royal remains, until, after a lapse of 3000 years, which we have reason to believe was the period assigned, the spirit which had once animated the body should re-enter it. Although built 5000 years ago, the masonry of the Pyramids could not be surpassed in these days; all those who have seen and examined them, as I myself have done, agree in this; moreover, the design is perfect for the purpose for which they were intended, above all to endure. This building of pyramids in Egypt continued for some ten centuries, and from 60 to 70 still remain, but none are so admirably constructed as those of Gizeh. Still, many contain enormous blocks of granite from 30 to 40 feet long, weighing more than 300 tons, and display the greatest ingenuity in the way in which the sepulchral chambers are constructed and concealed.

The genius for dealing with large masses in building did not pass away with the pyramid builders in Egypt, but their decendants continued to gain in mechanical knowledge, judging from the enormous blocks which they handled with precision. When the command of human labor was unlimited, the mere transport of such blocks as the statue of Rameses the Great, for instance, which weighed over 800 tons, need not so greatly excite our wonder; and we know how such blocks were moved from place to place, for it is shown on the wall paintings of the tombs of the period which still remain.

But as the weight of the mass to be moved is increased, it becomes no longer a question of only providing force in the shape of human bone and muscle. In moving in the last century the block which now forms the base for the statue of Peter the Great, at St. Petersburg, and which weighs 1200 tons, force could be applied as much as was wanted, but great difficulty was experienced in supporting it, and the iron balls on which it was proposed to roll the block along were crushed, and a harder metal had to be substituted. To facilitate the transport of material, the Egyptians made solid causeways of granite from the Nile to the Pyramids; and in the opinion of Herodotus, who saw them, the causeways were more wonderful works than the Pyramids themselves.

The Egyptians have left no record of how they accomplished a far more difficult operation than the mere transport of weight—that is, how they erected obelisks weighing more than 400 tons. Some of these obelisks must have been lifted vertically to place them in position, as they were by Fontana in Rome in later times, when the knowledge of mechanics, we know, was far advanced.

The practice of using large blocks of stone either as monoliths or as forming parts of structures has existed from the earliest times in all parts of the world.

The Peruvians used blocks weighing from 15 to 20 tons, and fitted them with the greatest nicety in their cleverly designed fortifications.

In India large blocks were used in bridges when the repugnance of Indian builders to the use of the arch rendered them necessary, or in temples, where, as in the Temple of the Sun, at Orissa, stones weighing from 20 to 30 tons form part of the pyramidal roof at a hight of from 70 to 80 feet from the ground. Even as late as the last century, Indians, without the aid of machinery, were using blocks of granite above 40 feet long for the doorposts of the gateway of Seringham, and roofing blocks of the same stone for a span of 21 feet.

At Persepolis, in the striking remains of the palaces of Xerxes and Darius, more than one traveler has noted the great size of the stones, some of which are stated to be 55 feet long and 6 to 10 feet broad.

So in the Greek temples of Sicily, many of the blocks in the upper parts of the temples are from 10 to 20 tons weight.

The Romans, though they did not commonly use such large stones in their own constructions, carried off the largest obelisks from Egypt and erected them at Rome, where more are now to be found than remain in Egypt. In the temples of Baalbek, erected under Roman rule, perhaps the largest stones are to be found which have been used for building since the time of the Pharaohs. The terrace wall of one of the temples is composed of three courses of stones, none of which are less than 30 feet long; and one stone still lies in the quarry squarred and ready for transport, which is 70 feet long and 14 feet square, and weighs upward of 1135 tons, or nearly as much as one of the tubes of the Britannia Bridge.

I have not mentioned dolmens and menhirs, rude unhewn stones often weighing from 30 or 40 tons, which are found from Ireland to India, and from Scandinavia to the Atlas, in Africa. To transport and erect such rude masses required little mechanical knowledge or skill, and the operation has excited more wonder than it deserves. Moreover, Fergusson has gone far to show that the date assigned to many of them hitherto has been far too remote; most, and possibly all, of these in Northern and Western Europe having been erected since the time of the Roman occupation. And to this day the same author shows that menhirs, single stones often weighing over 20 tons, are erected by hill tribes of India in close proximity to stone buildings of elaborate design and finished execution, erected by another race of men.

For whatever purpose these vast stones were selected—whether to enhance the value or to prolong the endurance of the buildings of which they formed a part—the tax on the ingenuity of those who moved and placed them must have tended to advance the knowledge of mechanical appliances.

The ancient Assyrians and Egyptians had possibly more knowledge of mechanical appliances than they are generally credited with. In the wall paintings and sculptures which show their mode of transporting large blocks of stone, the lever is the only mechanical power represented, and which they appear to have used in such operations; nor ought we to expect to find any other used, for, where the supply of human labor was unlimited, the most expeditious mode of dragging a heavy weight along would be by human power; to have applied pulleys and capstans, such as would now be employed in similar undertakings, would have been mere waste of time. In some countries, even now, where manual labor is more plentiful than mechanical appliances, large numbers of men are employed to transport heavy weights, and do the work in less time than it could be done with all our modern mechanical appliances. In other operations, such as raising obelisks, or the large stones used in their temple palaces, where human labor could not be applied to such advantage, it is quite possible that the Egyptians used mechanical aids. On one of the carved slabs which formed part of the wall panelling of the palace of Sardanapalus, which was built about 960 years before our era, a single pulley is clearly shown, by which a man is in the act of raising a bucket—probably drawing water from a well.

It has sometimes been questioned whether the Egyptains had a knowledge of steel. It seems unreasonable to deny them this knowledge. Iron was known at the earliest times of which we have any record. It is often mentioned in the Bible, and in Homer; it is shown in the early paintings on the walls of the tombs at Thebes, where butchers are represented as sharpening their knives on pieces of metal colored blue, which were, most probably, pieces of steel. Iron has been found in quantity in the ruined palaces of Assyria; and in the inscriptions of that country fetters are spoken of as having been made of iron, which is also so mentioned in connection with other metals as to lead to the supposition that it was regarded as a base and common metal. Moreover, in the Great Pyramid a piece of iron was found in a place where it must have lain for 5000 years. The tendency of iron to oxidize must render its preservation for any long period rare and exceptional. The quality of iron which is now made by the native races of Africa and India is that which is known as wrought iron; in ancient times, Dr. Percy says, the iron which was made was always wrought iron. It is very nearly pure iron, and a very small addition of carbon would convert it into steel. Dr. Percy says the extraction of good malleable iron directly from the ore "requires a degree of skill very far inferior to that which is implied in the manufacture of bronze." And there is no great secret in making steel; the natives of India now make excellent steel in the most primitive way, which they have practiced from time immemorial. When steel is to be made, the proportion of charcoal used with a given quantity of ore is somewhat larger, and the blast is applied more slowly than when wrought iron is the metal required. Thus, a vigorous native working the bellows of skin would make wrought iron where a lazy one would have made steel. The only apparatus required for the manufacture of the finest steel from iron ore is some clay for making a small furnace four feet high, and from one to two broad, some charcoal for fuel, and a skin with a bamboo tuyere for creating the blast.

The supply of iron in India as early as the fourth and fifth centuries seems to have been unlimited. The iron pillar of Delhi is a remarkable work for such an early period. It is a single piece of wrought iron 50 feet in length, and it weighs not less than 17 tons. How the Indians forged this large mass of iron and other heavy pieces which their distrust of the arch led them to use in the construction of roofs, we do not know. In the temples of Orissa iron was used in large masses as beams or girders in roof work in the thirteenth century.

The influence of the discovery of iron on the progress of art and science cannot be over estimated. India well repaid any advantage which she may have derived from the early civilized communities of the West if she were the first to supply them with iron and steel.

An interesting social problem is afforded by a comparison of the relative conditions of India and this country at the present time. India, from thirty to forty centuries ago, was skilled in the manufacture of iron and cotton goods, which manufactures, in less than a century, have done so much for this country. It is true that in India coal is not so abundant or so universally distributed as in this country. Yet, if we look still further to the East, China had probably knowledge of the use of metals as soon as India, and moreover had a boundless store of iron and coal. Baron Richthofen, who has visited and described some of the coal fields of China, believes that one province alone, that of Southern Shanshi, could supply the world at its present rate of consumption for several thousand years. The coal is near the surface, and iron abounds with it. Marco Polo tells us that coal was universally used as fuel in the parts of China which he visited toward the end of the fourteenth century, and from other sources we have reason to believe it was used there as fuel 2000 years ago. But what progress has China made in the last ten centuries? A great future is undoubtedly in store for that country; but can the race who now dwell there develop its resources, or must they await the aid of an Aryan race? Or is anything more necessary than a change of institutions, which might come unexpectedly, as in Japan?

The art of extracting metals from the ore was practiced at a very early date in this country. The existence long ago of tin mines in Cornwall, which are so often spoken of by classical writers, is well known to all. That iron was also extracted from the ore by the ancient Britons is most probable, as it was largely used for many purposes by them before the Roman conquest. The Romans worked iron extensively in the Weald of Kent, as we assume from the large heaps of slag containing Roman coins which still remain there. The Romans always availed themselves of the mineral wealth of the countries which they conquered, and their mining operations were often carried out on the largest scale, as in Spain, for instance, where as many as forty thousand miners were regularly employed in the mines at New Carthage.

Coal, which was used for ordinary purposes in England as early as the ninth century, does not appear to have been largely used for iron smelting until the eighteenth century, though a patent was granted for smelting iron with coal in the year 1611. The use of charcoal for that purpose was not given up until the beginning of this century, since which period an enormous increase in the mining and metallugical industries has taken place; the quantity of coal raised in the United Kingdom in 1873 having amounted to 127,000,000 tons, and the quantity of pig iron to upward of 6½ million tons.

The early building energy of the world was chiefly spent on the erection of tombs, temples and palaces.

While, in Egypt, as we have seen, the art of building in stone had 5000 years ago reached the greatest perfection, so in Mesopotamia the art of building with brick, the only available material in that country, was in an equally advanced state some ten centuries later. That buildings of such a material have lasted to this day shows how well the work was done; their ruinous condition even now is owing to their having served as quarries for the last three or four thousand years, so that the name of Nebuchadnezzar, apparently one of the greatest builders of ancient times, is as common on the bricks of many modern towns in Persia as it was in old times in Babylon. The labor required to construct the brick temples and palaces of Chaldæa and Assyria must have been enormous. The mound of Koyunjik alone contained 14¼ million tons, and represents the labor of 10,000 men for 12 years. The palace of Sennacherib, which stood on this mound, was probably the largest ever built by any one monarch, containing as it did more than two miles of walls, panelled with sculptured alabaster slabs, and 27 portals, formed by colossal bulls and sphinxes.

The pyramidal temples of Chaldæa are not less remarkable for the labor bestowed on them, and far surpass the buildings of Assyria in the excellence of their brickwork.

The practice of building great pyramidal temples seems to have passed eastward to India and Burmah, where it appears in buildings of a later date, in Buddhist topes and pagodas—marvels of skill in masonry, and far surpassing the old brick mounds of Chaldæa in richness of design and in workmanship. Even so late as this century a king of Burmah began to build a brick temple of the old type, the largest building, according to Ferguson, which has been attempted since the Pyramids.

The mere magnitude of many of these works is not so wonderful when we take into account the abundance of labor which those rulers could command. Countries were depopulated, and their inhabitants carried off and made to labor for the conquerors. The inscriptions of Assyria describe minutely the spoils of war and the number of captives; and in Egypt we have frequent mention made of works being executed by the labor of captive peoples. Herodotus tells us that as many as 360,000 men were employed in building one palace for Sennacherib. At the same time it must not be forgotten that the very character of the multitude would demand from some one the skill and brain to organize and direct, to design and plan the work.

It would be surprising if men who were capable of undertaking and successfully completing unproductive works of such magnitude did not also employ their powers on works of a more useful class. Traces still remain of such works; enough to show, when compared with the scanty records of the times which have come down to us, that the prosperity of such countries as Egypt and Mesopotamia was not wholly dependant on war and conquest, but that the reverse was more likely the case, and that the natural capabilities of those countries were greatly enlarged by the construction of useful works of such magnitude as to equal, if not in some cases surpass those of modern times.

Egypt was probably far better irrigated in the days of the Pharaohs than it is now. To those unacquainted with the difficulties which must be met with and overcome before a successful system of irrigation can be carried out, even in countries in which the physical conditions are favorable, it may appear that nothing more is required than an adequate supply of unskilled labor. Far more than this was required: the Egyptians had some knowledge of surveying, for Eustathius says they recorded their marches on maps; but such knowledge was probably in those days very limited, and it required no ordinary grasp of mind to see the utility of such extensive works as were carried out in Egypt and Mesopotamia, and, having seen the utility, to successfully design and execute them. To cite one in Egypt—Lake Mœris, of which the remains have been explored by M. Linant, was a reservoir made by one of the Pharaohs, and supplied by the flood waters of the Nile. It was 150 square miles in extent, and was retained by a bank or dam 60 yards wide and 10 high, which can be traced for a distance of 13 miles. This reservoir was capable of irrigating 1200 square miles of country. No work of this class has been undertaken on so vast a scale since, even in these days of great works.

The prosperity of Egypt was in so great a measure dependent on its great river, that we should expect that the Egyptians, a people so advanced in art and science, would at an early period have made themselves acquainted with its *regime*. We know that they carefully registered the hight of the annual rise of its waters; such registers still remain inscribed on the rocks on the banks of the Nile, with the name of the king in whose reign they were made. The people of Mesopotamia were equally observant of the *regime* of their great rivers, and took advantage in designing their canals of the different periods in the rising of the water of the Tigris and Euphrates. A special officer was appointed in Babylon, whose duty it was to measure the rise of the river; and he is mentioned in an inscription found in the ruins of that city, as recording the hight of the water in the Temple of Bel. The Assyrians, who had a far more difficult country to deal with, owing to its rocky and uneven surface, showed even greater skill than the Babylonians in forming their canals, tunneling through rock, and building dams of masonry across the Euphrates. While the greater number of these canals in Egypt and Mesopotamia were made for the purpose of irrigation, others seem to have been made to serve at the same time for navigation. Such was the canal which effected a junction between the Mediterranean and the Red Sea, which was a remarkable work, having regard to the requirements of the age in which it was made. Its length was about eighty miles; its width admitted of two triremes passing one another. At least one of the navigable canals of Babylonia, attributed to Nebuchadnezzar, can compare in extent with any work of later times. I believe Sir H. Rawlinson has traced the canal to which I allude throughout the greater part of its course, from Hit on the Euphrates to the Persian Gulf, a distance of between four and five hundred miles. It is a proof of the estimation in which such works were held in Babylonia and Assyria, that, among the titles of the god Vul were those of "Lord of Canals," and "The Establisher of Irrigation Works."

The springs of knowledge which had flowed so long in Babylonia and Assyria were dried up at an early period. With the fall of Babylon and destruction of Nineveh the settled population of the fertile plains around them disappeared, and that which was desert before man led the waters over it became desert again, affording a wide field for, and one well worthy of, the labors of engineers to come.

Such was not the case with Egypt. Long after the period of its greatest prosperity was reached, it remained the fountain head from whence knowledge flowed to Greece and Rome. The Philosophers of Greece and those who, like Archimedes, were possessed of the best mechanical knowledge of the time, repaired to Egypt to study and obtain the foundation of their knowledge from thence.

Much as Greece and Rome were indebted to Egypt, it will probably be found, as the inscribed tablets met with in the mounds of Assyria and Chaldæa are deciphered, that the latter civilizations owe, if not more, at least as much, to those countries as to Egypt. This is the opinion of Mr. Smith, who, in his work describing his recent interesting discoveries in the East, says that the classical nations, "borrowed far more from the valley of the Euphrates than that of the Nile."

(To be continued.)

The Providence Tool Company's Affairs.—A dispatch from Providence, bearing date of Dec. 23d, says: The committee appointed to investigate the affairs of the Providence Tool Company, submit a statement recommending an extension upon the entire indebtedness, covering thirty-six months from Jan. 1 next, with equal semi-annual payments, commencing July 1, 1876, with interest at seven per cent. per annum. The committee say that, if the company can receive this indulgence from their creditors, and thus preserve their valuable contracts, we have confidence to believe that they will be able to pay all their debts, both principal and interest, in full. The committee express full confidence in the integrity of the officers of the company and of their intention to devote their entire energies to the fulfillment of the terms of the extension, if granted, and if within their ability to anticipate the time of payment. The committee state the assets of the company at $4,145,000 and the liabilities at $2,783,207.

The Great Western Stove Company, of Leavenworth, Kansas, employ 125 hands, and ship a car load of stoves daily, on an aver

Pumps.

The problem of raising water was the first one of a mechanical or engineering character which the human race was called upon to solve. The most barbarous races, as well as the civilized, are alike compelled to draw water. The means used may be simple or complex, but the necessity is equal in both cases, and in not a few instances the means used are identical. The question of how to raise water is not only the most important but the most frequently recurring of all the mechanical problems which the modern engineer has to solve, and, unlike other things of the kind, this is a question which personally concerns every individual of the community. The earliest device for the purpose was probably an earthen pot or a bag of skin attached to a cord and let down to the spring or into the well.

The shadoof, or common well sweep, seems to have been the next step, and, from drawings found in Egypt, it is proved that this device is at least 3000 years old, and probably even older. Of simple forms of water raising contrivances, such as flutter wheels, chain pumps, Persian wheels—having a number of pots upon a rope or chain—and the simple suction pump, it may be safely said that there is little, if anything, new for the last thousand years or more, modern progress consisting chiefly in improvement in workmanship, better materials and a greater attention to the details.

Very early in the history of the world, animal power was used to assist in the raising of water, and tread wheels, horizontal winding drums, and the direct attachment of animals to the bucket rope, which was led over a pulley, were some of the more common means used. The plumber in dealing with the question of water raising has usually to depend upon manual labor, or upon some motor like wind, steam or hot air engines, or the like, animal power being rarely employed, because a "horse-power," or similar machine for utilizing the force of animals, usually costs more than a small steam engine or other prime mover of equal power.

Men, taken at an average, are equal to the production of one-fifth of a horse-power for 10 hours per day. A strong man has, for a few minutes at a time, exerted a force equal to more than half a horse-power, lifting a weight of 18,000 lbs. one foot high in a minute, but this could not be kept up. In estimating the quantity of water required in any given job, a man's power can be estimated as equal to the raising of 4500 lbs. one foot high per minute. At this rate, a pump with a 4 inch bore and one-half inch pipe, delivering 40 gallons per minute 16 feet high, would require the full strength of an able bodied man. Half the quantity could be lifted to twice the hight—that is, 20 gallons per minute 32 feet high, and so on. As the length of the pipe increases, the quantity delivered would be diminished, but this diminution would be very small, and would not especially affect the result. In putting in a pump to be worked by hand, a mistake is often made in choosing one in which the leverage is so large that the hand does not have a decidedly perceptible resistance, and is obliged to travel over a very great distance to do the work. The books give a resistance of 30 lbs., and a speed of 2½ feet per second, as the greatest rate of speed at which work can be kept up. The weight, we should judge, was about right, but we think that the speed is much greater than can be conveniently attained in pumping. We should think that a double 18 inch stroke would be much nearer a practicable rate. That is 3 feet per second, but only half of the time performing work.

When a man has to work a pump for a short lift, we see no objection to the use of a good sized barrel, so as to obtain a fair amount of resistance. This reduces the time necessary for pumping a given quantity of water, though it makes the work a little harder. Where a pump has to be used by women and children, especially if the whole distance through which the water is carried is considerable, a pump which works easily is absolutely necessary. In such cases a pump with a long leverage and a comparatively small bore must be selected. For a well or cistern from which a great deal of water is to be drawn by different persons, as, for instance, one by which a large school is supplied, it is necessary that the pump should deliver a large quantity of water at each stroke. No one individual pumps more than one or two pails full at a time, and it makes little difference whether the whole force is expended in two or three stokes or in seven or eight. It would make a vast saving in time, however, when the pail is filled in two strokes. In setting up a pump that delivers a great quantity of water at each stroke, care should be taken to have a large nozzle and a free water way, otherwise the stream will be too violent and spatter and splash. This is a very common fault with many pumps when they are worked rapidly. The distance to which water can be raised by the common lifting pump varies with the hight above the sea level, and also with the pressure of the atmosphere. At the sea level the column of water that the atmosphere will support is about 33 feet in hight, and a pump will draw water, as it is called, this distance, but it must be remembered that the force which sends the water into the pump at this hight is so small as to be almost balanced by the weight of the water; hence a lifting pump would deliver water very slowly, drawing it this distance. The nearer the pump barrel is to the surface of the water, the more rapidly the pressure of the atmosphere forces the water through the suction pipe. Hence, many manufacturers in putting up a pipe never put it further than 25 feet from the water level. This sends the water to the pump with a force nearly equal to a head of 7 or 8 feet. Where a greater distance is unavoidable as, for example, where the suction pipe must be very long, and where the pump has a large bore and is worked rapidly, a vacuum chamber is very valuable in preventing the water from "breaking" in the pipe. With pitcher and other pumps having very large cylinders, the suction pipe can rarely be made large enough to supply the pump, and when working fast there is a loss both of power and capacity. Our experience with pumps leads us to think that a vacuum chamber is very desirable at any time. We have seen a pump, of say 2 or 2½ inch bore, supplied through a long half inch pipe fitted with a vacuum chamber, and found that, by the most rapid pumping, it was almost impossible to "break" the water in the suction pipe—the chamber in this case drawing water on the down stroke of the bucket and forming a reservoir from which the pump can draw on the up stroke.

In putting up pumps plumbers frequently pay too little attention to them. When a pump is ordered, care should be taked to obtain a pump suitable for the work to be done, neither too large nor too small, and the connections should by all means be properly made. Not long since a boiler pump was returned to a manufacturer because it would not work, and, on examination, it was found that the suction pipe had been put on to the delivery opening and the delivery pipe on the suction. It was, of course, little wonder that the engineer could not get his boiler full of water. It often happens that a house pump is put up in such a way that the water cannot be made to run down. This may happen through accident or design. Where, on the approach of cold weather, the plumber intentionally leaves the house pump in such a condition that the water cannot be allowed to run out of the pipe, he should be held responsible for the damage resulting. Such things should always be discountenanced, as they bring the trade into bad repute. If it is done in ignorance or carelessness it is also to be regretted. In the next article of this series we will give some useful data in regard to pumps and their efficiency.

Until within a few years the form of pump in common use consisted of a single log of wood, bored out, and provided with a spear, two valves and a spout. The bark was removed, but there was seldom any attempt to shape the log, or reduce its size, unless, perhaps, around the top. The objection to this form of pump was found in the fact that the wood decayed, and the inside of the pump barrel disintegrated. The surface of the wood also became slimy, and after a few years' use the water would be found charged with particles of wood fiber, and fungiod growths. Their durability was surprising, however, and in spite of the objections named, water was delivered by them in very pure condition—at least, until the pumps had become old. The selection of the log determined in a great degree the life of the pump. But, while in some respects admirably adapted to outdoor wells of moderate depth, they were not efficient in delivering water from wells of 60 feet or more in depth, as the power required to work them was out of all proportion to the amount of water raised. The reason for this was the necessarily large size of the bore, and consequent heavy load always on the plunger. While still in limited use, however, wooden pumps of this kind have been to a great extent superseded by lighter and cheaper ones made by machinery.

Following the primitive form of wood pump, came the chain pump, which was also adapted to raising water from wells of moderate depth. This, although one of the oldest form of pumps known, has come into use in this country within twenty years. It is very cheap, simple, durable, and will rarely freeze in the coldest climate. A chain pump will raise water with great rapidity—faster, perhaps, from wells of moderate depth, than any other mechanical device in use. In deep wells, however, the labor of raising water by the chain is very severe, as there is a long column of water to be supported, and the leakage is very considerable. The waste of power increases as the tubing wears, giving the chain free play from side to side. The only really objectionable feature of this pump is the zinc coating which it is commonly considered necessary to give the chain. The chances of zinc poisoning from this cause are very small, but we have heard of instances in which zinc poisoning has been traced to this cause and proved by crucial tests.

Since the day of the chain pump, the iron pump has come into more general use than any other device for lifting water. What is commonly known as the cistern pump, is made by all pump manufacturers and has become standard. In their general features all pumps of this class are alike, consisting of a cast iron cylinder, with spout; a base for securing it to the platform upon which it stands; a brake and its fulcrum, or stand; a piston, piston rod and valves. These pumps are in use in nearly all parts of the world, and have been for some years an important article of export. In this country they are used by the million, and, all things considered, they are the cheapest, most durable and most efficient hand pumps ever made. In these pumps the diameter of bore ranges from 2 to 3¼ inches, increasing by quarters of an inch. The pipes used with them are from three-quarter inch to 2½ inches, and may be of any kind known to the trade. The following table shows the average efficiency of good pumps of this pattern, worked moderately with one hand:

Diameter of bore.	Gallons per min.
2 in.	6
2¼ "	8
2½ "	12
2¾ "	15
3 "	22
3¼ "	26
3½ "	30

The size of pipes used with pumps of this class should be determined with reference to the hight to which the water has to be raised. The following table will be useful to those who put in pumps and make the connections.

Size of bore.		Size of pipe.
2 in.	For any ordinary hight	1¼ in.
2¼ "	Under 18 ft.	1¼ "
	Over 18 ft.	1 "
2½ "	Under 18 ft.	1 "
	Over 18 ft.	1¼ "
2¾ "	Under 18 ft.	1¼ "
	Over 18 ft.	1½ "
3 "	Under 18 ft.	1½ "
	Over 18 ft.	1¾ "
3¼ "	Under 18 ft.	1¾ "
	Over 18 ft.	2 "
3½ "	Under 18 ft.	2 "
	Over 18 ft.	2¼ "

Pumps of this class weigh from 15 to about 50 lbs. each. Leather valves and packing are commonly used, but brass valves can be had from the makers when hot water is to be pumped. Properly cared for, these pumps will wear for an indefinite period. Various parts may get out of order, and persons inexperienced in such matters are apt to think that a new pump is needed. Commonly, this is a mistake. Pumps of this class are made on the system of interchangeability of parts, and any part which wears out or breaks can be replaced at small cost. The most expensive part of a small size of this style of pump—the cylinder—costs less than half the price of a new pump, and $1·50 will replace all the parts likely to wear out in many years' service. A few cents spent on new leather as often as may be necessary, and an occasional tightening of screws and nuts, will extend the life of such a pump indefinitely. If a pump "runs down" when left standing for a few minutes, and water must be poured into the barrel to make the piston suck, it needs attention. The repairs needed to correct these defects are easily made, but if neglected the pump will rapidly wear out.

In the succeeding parts of this series other forms of apparatus in common use for raising water will be considered.

(To be continued.)

The new water works for Virginia City will not be completed before June, 1876. The cost will be $130,000.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Dec. 29, 1875.

The past week, with the interruption of Christmas, has been a dull one in the financial markets. The money market proper shows a fair degree of firmness, and the rate on call loans is 7 per cent. The discount rate on prime mercantile paper with two names is 6 @ 8½ per cent.

The gold market has been quite steady during the week, and the premium has fluctuated within narrow limits. On Monday the Assistant Treasurer began the payment of the January interest, amounting to $25,039,734. This will render coin abundant for the time, and tend to keep the premium steady. The following shows the highest and lowest daily quotations since our last report:

	Highest.	Lowest.
Thursday	113⅝	112⅛
Friday	113⅛	113
Saturday	—	—
Monday	113	112⅝
Tuesday	113	112¾
Wednesday	113⅛	113

Government bonds are strong at home and abroad. Desirable railroad securities are strong and in good investment demand. We give below the closing quotations of governments.

The stock market was weak and uneven until Monday, when it became stronger, and has since continued firm. The principal dealings have been in Lake Shore, Erie, Pacific Mail, Western Union, St. Paul and Northwestern.

The movements of the week in foreign trade are shown in the following tables:

IMPORTS.

	1873.	1874.	1875.
Total for week	$3,919,882	$2,965,573	$2,372,583
Prev. reported	373,987,227	377,389,660	315,625,161
Since Jan. 1	$377,907,109	$380,355,233	$317,997,694

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Brass goods	4	$309
Bronzes	5	994
Chains and anchors	12	502
Cutlery	16	4,701
Guns	62	9,511
Hardware	8	1,094
Iron, other, tons	940	50,703
Lead, pigs	1,610	9,946
Metal goods	49	6,127
Nails	2	607
Needles	12	7,054
Per. caps	7	1,041
Saddlery	3	676
Steel	785	6,093
Silverware	4	2,104
Tin, boxes	8,650	50,979
Wire	1	624

EXPORTS, EXCLUSIVE OF SPECIE.

	1873.	1874.	1875.
Total for week	$6,075,750	$5,256,477	$3,739,424
Prev. reported	293,273,871	281,672,623	241,767,862
Since Jan 1	$299,349,621	$286,929,100	$255,507,286

EXPORTS OF SPECIE.

Total for the week	$12,529
Previously reported	12,727,761
Total since January 1, 1875	$12,740,290
Same time in 1874	6,251,725
Same time in 1873	18,779,929
Same time in 1872	5,547,311

The bank statement for the week shows a loss in total reserve of only $544,200—this notwithstanding a loss of $1,198,300 in legal tender notes. By reason of the reduction in liabilities—the deposits having fallen $3,595,200—there is a gain in the surplus reserve of $354,600. In other words, the banks have a surplus reserve of $7,361,900 this week, against $7,007,300 last week. It is safe to assume, however, that the legal tender average is a falling one; but, on the other hand, the specie average is a rising one. The following is a comparison of the bank averages for the past two weeks:

	Dec. 18.	Dec. 25.	Differences.
Loans	$265,512,500	$263,688,500	Dec. $1,829,000
Specie	16,105,800	16,759,900	Inc. 654,100
Legal tend's	41,960,500	40,762,200	Dec. 1,198,300
Deposits	201,236,000	200,640,800	Dec. 3,595,200
Circulation	19,028,600	18,950,700	Dec. 77,900

Government bonds at the close were quoted as follows:

	Bid.	Asked.
U. S. Currency 6's	122½	123
U. S. 6s 1881, reg	119¼	119½
U. S. 6s. 1881, coup	123¾	124½
U. S. 5-20 1862, reg. (Called)	—	—
U. S. 5-20 1862, coup. (Called)	—	—
U. S. 5-20 1864, reg. (Called)	114	—
U. S. 5-20 1864, coup. (Called)	114	—
U. S. 5-20 1865, reg.	115⅛	115¾
U. S. 5-20 1865, coup.	115⅜	116
U. S. 5-20 1865, new	116⅛	117
U. S. 5-20 1865, coup.	120⅛	123⅛
U. S. 5-20 1867, reg.	119	119¼
U. S. 5-20 1867, coup.	122⅛	122⅝
U. S. 5-20 1868, reg.	119	119⅛
U. S. 5-20 1868, coup.	122⅛	122⅞
U. S. 10-40 reg.	117⅛	117¾
U. S. 10-40 coup.	117⅜	118
U. S. 5s, 1881, reg.	116⅜	117
U. S. 5s, 1881, coup.	116¾	117

The latest sales and closing quotations of stocks were as follows:

	Bid.	Asked.
Atlantic & Pacific R. R. Preferred	3¾	4
Atlantic and Pacific Telegraph	18	19
Chicago & Northwestern	39	39½
" " Pref.	56⅛	56⅜
Chicago, Rock Island and Pacific	104¾	104⅞
Col., Chic. & Ind. Cent.	3⅛	3¼
Clev., Col., Cin. & Ind's	58⅜	59⅛
Cleveland and Pittsburgh	89⅛	89⅜
Chicago & Alton	97⅜	98
" " Pref.	105⅜	106
Consolidation Coal	45¾	46⅛
Canton	37⅜	40
Del. Lack. and Western	120½	120⅝
Delaware & Hudson Canal	123¾	124
Adams Express	101⅜	102⅛
American Express	56⅜	56¾
United States Express	62	63
Wells, Fargo & Co. Express	85	86
Erie	15⅜	15⅝
Harlem	130½	131
Hannibal & St. Joseph	20½	21
" " Pref.	27¾	28
Illinois Central	97	97⅛
Kansas Pacific	13	14
Kansas & Texas	6	7
Lake Shore	59½	59¾
Michigan Central	58⅛	58¾
Morris & Essex	101¾	102¼
Milwaukee & St. Paul	35⅛	35¾
" Pref.	66⅜	66¾
Mariposa	8⅜	9⅛
" Pref.	9	10
New York Central	104¾	105
New Jersey Central	105¾	106
Ohio & Mississippi	16⅞	17⅛
Pacific Mail	39¼	39⅜
Panama	125	127
Pittsburgh & Fort Wayne	97	98
Pacific of Missouri	11¾	11⅞
Quicksilver	17⅝	18¾
" Pref.	23	24
St. L., Kan. City Northern	4	4¼
" Pref.	22	23½
Tol., Wabash & Western	3¼	3½
Union Pacific	74	74⅜
Western Union Telegraph (ex'd)	73⅝	73½

GENERAL HARDWARE.

The Hardware trade participates in the usual dullness common to the holiday season. A good deal of preparation for the coming year, in the revision of lists and discounts, is going on, and some of these which are now ready will not be distributed until after the 1st of January.

The American Screw Company will, at an early day, make a further reduction in the price of Gimlet Pointed Screws.

The Tack manufacturers held a meeting in Boston to-day, and although the particulars have not reached us, we are able to say that the discount off Half and Full Weight Tacks has been increased, and some other changes adopted, to go into effect January 1st.

In Foreign Hardware there is little doing, and prices continue unchanged.

The Nail market continues, as far as value and demand is concerned, in much the same condition as at our last writing. We hear of a good deal of inquiry from purchasers of large lots, and the tone of the market is decidedly strong. We continue to quote 10d. at $3 per keg, net; for lots of 200 kegs and over this price could be shaded a trifle.

Henry Disston & Sons will issue in a day or so their revised list and discount sheet for Saws and other goods of their manufacture.

J. Clark Wilson & Co. quote Wellington Mills Genuine London Emery at 10 cents per pound for Grain and 8 cents per pound for Flour, net.

The Meriden Cutlery Co., No. 43 Chambers street, have made the following changes in their price list:

1075, Carvers.....from $2·75 to $3·00 per pair.
1075, " ..... " 3·35 to 3·60 per set.
476, Nut Picks..... " 3·75 to 4·75 per doz.
4760, " ..... " 5·25 to 6·25 per doz.

The Old Colony Rivet Works will issue the following circular on the 1st proximo:

Office of the OLD COLONY RIVET WORKS,
KINGSTON, MASS., Jan. 1, 1876.

GENTLEMEN: On and after this date the discounts on Norway Iron Rivets of my manufacture will be as follows, viz.:

Black and Tinned, in M packages.....dis. 40 %
Rivets in bulk..... " 20 %
To jobbing and commission houses 7½ per cent. additional.

As a first quality article of Norway Iron Rivets cannot be produced at the prices heretofore ruling, to avoid loss it becomes a necessity either to advance rates or to manufacture an inferior or second quality article.

Believing that the interests of both my patrons and myself will be the better served by a maintenance of quality, I have adopted this course.

With thanks for past patronage, and desiring to serve you in the future as in the past with a first-class article, I am, very truly, yours,

JAS. L. HALL, Prop.

Factory, Kingston, Mass.; Warehouse, 34 Warren st., New York.

The Ansonia Brass and Copper Co. have issued the following circular:

NEW YORK, Dec. 14, 1875.

DEAR SIRS: We beg leave to inform you that the damage to our copper mill by fire, on December 11th, will be quickly repaired, and that, meanwhile, we have made arrangements by which we can fill orders for Copper of every size and description with the usual dispatch.

We have constantly on hand a large stock of Braziers', Bolt and Sheathing Copper, Tinned Copper, Patent Planished Copper, Soldering Coppers, Copper Bottoms, etc., together with the products of our brass mill, clock factory and iron wire mill, for which we will be glad to receive orders.

We are, very respectfully, yours,
ANSONIA BRASS & COPPER CO.

E. M. Boynton occupies the whole of the 17th page this week with an advertisement illustrating his Patent "Lightning" Saws and other specialties of his manufacture. We are informed that the demand for export for these goods has attained this year very handsome proportions.

BRITISH IRON MARKET.

(*Specially reported by cable for The Iron Age.*)

WEDNESDAY, Dec. 29, 1875.

Scotch Pig.—The returns for the past week show a very large increase in the shipping demand over the corresponding period of last year, and quotations for makers' irons have advanced several shillings per ton over the figures quoted by cable last week. The following are quotations for makers' irons.

Gartsherrie No. 1	73/6
Coltness No. 1	79/6
Glengarnock No. 1	71/
Eglinton No. 1	65/6

Manufactured Iron and Rails are without change to report.

IRON.

American Pig.—There is almost nothing to report. During the week transactions have been small and few, and prices are unchanged. The Thomas Iron Company report the sale of 700 tons No. 1 Foundry, in lots, at $23; 200 tons No. 2 Foundry at $21; and 100 tons Gray Forge at $20. We continue our quotations without change.

Scotch Pig.—The market has been dull since our last, and there are no important sales to note. The stock here is about 1500 tons. We quote Coltness, $33; Glengarnock, $31; Gartsherrie, $32·50; and Eglinton, $29·50 @ $30.

Rails.—The recent large sales of Steel Rails, and further negotiations pending, have been the principal topic of interest. We quote American Iron, at mill, $42 @ $46.

Old Rails.—We continue our quotation of $22·50; but this price is purely nominal, as it is above the views of buyers and below those of the majority of holders. There have been no sales.

Scrap.—There is no new feature in Wrought Scrap Iron. We quote $30.

METALS.

Copper.—Not much activity was to be expected during the last week of the year, which proved a dull one, indeed, sales of Lake Superior being restricted to 250,000 pounds at 23¼c. @ 23⅝c., the inside figure being the closing one, without much demand even at this. The general business outlook for the ensuing year is a promising one, if anything. In a letter of the New York correspondent of the London *Economist* we find the following passage, after an enumeration of the failures and private arrangements which have occurred in this country during the past three years: "It seems evident that in the United States the process of purification has been nearly completed, and that a real revival of industry, founded on real values, is becoming an actual, or at least a near, event." In Europe and elsewhere the process of purification is still going on vigorously, and we shall, in all likelihood, be the first from among the commercial nations whose trade will be resuscitated on a safe basis. This basis, we presume, will be reached when improved real estate shall have touched bottom; we shall be able to form some opinion on this subject early in spring. Returning confidence in real estate values will start the building trade, and all metals will be favorably influenced thereby. Such at least is the impression among people in the metal trade, and we trust that these expectations may be fulfilled. In our last report we gave some statistics from the *Mining Gazette*, of Houghton; the following explanation is added in reference thereto: "The table published in last week's issue was from the books of the smelting works at this point, and gave the figures of the Ingot Copper and mineral that passed through their hands. As some of the mines get a portion of their mineral smelted here and at Detroit, it is well to state, in order that the table given by us may not be misunderstood, that the Quincy shipped, during the season of navigation of 1875, 1704 tons 1395 pounds of mineral from the mine, and that the Atlantic sent from the mine, from the close of navigation of 1874 to the close of navigation, 1875, 1049 tons 1798 pounds of mineral. In the table referred to, the Atlantic was credited with shipping only 120 tons 1754 pounds of Ingot Copper, while the Quincy shipments for the year were omitted." London is unchanged at £81. 10/ for Chili Bars, and £88 Best Selected. The manufactures of Copper are steady, as follows: New Sheathing, 30c.; Bolts and Braziers', 31c.; Nails, 38c. @ 39c.; Bronze and Yellow Metal Sheathing, 21c.; Yellow Metal Bolts, 28c., and do. Nails, 21c., net cash.

Tin.—Our market has relapsed into a quiet mood, though a tolerably firm one, at the following quotations in gold, large lots: Straits, 19¼c. @ 19½c.; English Refined, 19¼c.; English Common, 19c., and Banca, 23½c. @ 24c. London to-day wires Straits, £81. 10/, and Singapore has from $23·12½ risen to $23·50, and is now wired $23·37½, with a reduced stock. Later telegraphic advices from the Straits settlements are decidedly favorable to the English, who seem to meet with hardly any resistance in their operations against the turbulent Malays. Accounts are to hand by mail from Australia expatiating on the abundance of Tin in Van Diemen's Land (Tasmania). The ore at the same time seems to be of unusual richness. Advices from London by mail report shipments of English Tin, from England, to have been 318 tons in November, 106 of which to this country. The distribution of Tin to consumption from New York and Boston during the past six months has been 1564 tons, against 2574 the preceding six months, making a total for the year of 4138 tons, against 4629 and 4313 in 1874 and 1873. This is a decided disappointment, inasmuch as it was hoped that the deliveries would continue on a liberal scale during the remainder of the year. Tin Plates have been quiet but firm. We quote, gold, per box, in large lots, ordinary brands: Charcoal Bright, $7·50 @ $7·75; ditto Ternes, $7 @ $7·25; Coke Tin, $6·62½ @ $6·75, and ditto Ternes, $6·25 @ $6·50. In England orders abound.

Lead—Presents no new features, and the week has been pretty much the dullest of the year. Sales have been confined to 50 tons Common Domestic at 5·90c., gold. Soft Missouri, here, we quote 7¾c., currency, and Foreign, 7⅛c., gold. Europe has again risen 5/, and remained firm at the improvement at last accounts. The manufactures of Lead are quiet and unchanged.

Spelter and Zinc.—Domestic Spelter has been stagnant at 7·40c., currency, less the discount, while of Foreign nothing sold, either on the spot or futures, the stock being 145 tons C. G. H. and W. H., which may be quoted 7·27½c. @ 7·37½c., gold. Import of Foreign during the year but 540 tons, against 1050 and 2525 the previous two. In Europe the metal remains scarce, and a steady demand causes it to still tend upward. *Sheet Zinc.*—Nothing is going on therein, and we quote the article 8¾c. @ 9c., gold.

Antimony.—"Cookson" brand is scarce, and concentrated in one hand, bringing 14½c., gold, while other brands in better supply command 14¼c., gold, and no more. Market quiet.

COAL.

The Coal trade, both Anthracite and Bituminous, may now be quoted as being very dull. The season for shipping to many of the ports is now over, and the stocks on hand are quite ample for supplying the current wants. The programme for next season will, no doubt, be arranged upon the same basis as now prevails. From the latest dispatches from Philadelphia, we are informed that the leading Coal companies in the Wyoming region have agreed upon a total suspension for one month, to take effect on the last day of December.

At a meeting of the New York Lehigh Coal Exchange, held Dec. 20th, the following prices were adopted for January shipments at Elizabethport, Port Johnson and Hoboken:

Lump	$5·55
Broken	5·55
Egg	5·65
Stove	6·10
Chestnut	5·10

The quantity of Coal sent from the Schuylkill region for the past week was, by rail, 83,507 tons; by canal, 1727 tons; total, 85,234 tons, against 67,661 tons for the corresponding week of last year. Increase, 7583 tons. The quantity sent so far for the year beginning December 1 was 236,445 tons, against 290,663 tons for the corresponding period last year. Decrease, 54,218 tons.

The quantity sent from all the regions for the week was: 398,801 tons Anthracite, and 279,781 tons Bituminous; total, 678,581 tons, against 284,826 tons Anthracite, and 24,857 tons Bituminous; total, 309,683 tons for the corresponding period of last year. Increase of Anthracite, 113,975 tons; increase of Bituminous, 254,924 tons. Total increase, 368,899 tons.

The quantity sent from all the regions so far this year was Anthracite 20,116,645 tons, and Bituminous, 3,856,334 tons; total, 23,972,979 tons, against 20,032,095 tons Anthracite, and 3,540,769 tons Bituminous; total, 23,572,864 tons for corresponding period of last year. Increase, 400,115 tons.

We quote as follows: Anthracite, $4·95 @ $6·10; Cumberland, $6·25 @ $6·75; West Virginia, $6·75; James River Steam, $6·25; James River Carbonite, $9 @ $9·50; Kanawha House, $11·50; American Gas, $6·75 @ $7·25; American Cannel, $12 @ $14; Pennsylvania and Westmoreland, $6·75; Newburgh Orrel, $6·50; Sterling Ohio, $10; Ince Hall, $17 @ $18; Liverpool House Cannel, $17; Liverpool Gas, $12; Newcastle Gas, $7; Scotch, $7·60.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending Dec. 28, 1875:

Hardware.

Brown Bros. & Co.
Per. caps, cs., 1
Bamberger & Oppenheimer,
Cases, 12
Blumenthal I. & A.
Metalware, cs., 2
Boker Hermann & Co.
Iron ware, cs., 10
Calhoun, Robbins & Co.
Cases, 1
Frasse P. A. & Co.
Metalware, cs., 1
Mdse. pkgs., 2
Flesch A. & D. & Co.
Cases, 4
Fuller Bros.
Chains, cks., 6
Feldmann & Decker,
Cases, 31
Field A. & Co.
Casks, 7
Cases, 10
Chains, cks., 37
Gillespie J. D. C.
Cases, 7
Hutchinson J. W.
Arms, cs., 7
Knauth, Nachod & Kuhne.
Cases, 1
Kaldenberg J.
Cases, 1
Packages, 3
Lau & Garlichs,
Mdse. pkgs., 8
Merchants Dispatch Co.
Wire rope, pkgs., 5
Mayer Robert & Co.
Ironware, cs., 3
Meier Geo. & Co.
Ironware, cs., 5
Peters Bros.
Cutlery, cs., 4
Rosenfeld Bros.
Hardware, cs., 2
Schoverling & Daly,
Mdse. pkgs., 2
Sawyer J.
Wire rope, coils, 2
Tillotson L. G. & Co.
Galv. wire, lots, 111
Van Wart & McCoy,
Mdse. pkgs., 26
Wiebusch & Hilger Mfg. Co.
Cases, 7
Casks, 9
Anvils, 96
Packages, 6
Chains, cks., 2
Wolffe S. N. & Co.
Ironware, cks., 4
Windmuller L. & Roelker
Arms, cs., 8
Order.
Cutlery, cs., 1
Files, cks., 6
Gun barrel molds, cs., 100
Packages, 3

Iron.

Hamlin & Son,
Tons, 25
Henderson Bros.
Pig, tons, 100
Lang W. Bailey & Co.
Bars, 276
Bundles, 165
Morton, Bliss & Co.
Scrap, tons, 62
Phelps, Dodge & Co.
Plates, bxs., 150
Vatable H. A. & Son,
Scrap, tons, 100
Whitney A. R. & Bro.
Wrought, flues, 340
Order.
Pig, tons, 400
Scrap, cs., 50
Spiegel, lots, 1

Steel.

Benedict E.
Cases, 4
Brown Wm.
Cases, 6
Bundles, 158
Frith Edward,
Cases, 22
Haigh J. Lloyd,
Wire, bdls., 87
Hogan John.
Casks, 7
Cases, 14
Prosser Thos. & Sons,
Wheels, 4
Tire forgings, 68
Pierrons & Co.
Bessemer, bdls., 222
Sulzbacher & Hymane,
Wire rollers, 50
Pieces, 8
Cases, 6
Packages, 80
Woodford W. O.
Cases, 83
Bundles, 13
Order.
Scrap leaf, tons, 55
Bundles, 75

Metals.

Byrne Joseph & Co.
Tin plates, bxs., 550
Bruce & Cook,
Tin plates, bxs., 400
Coe Brass Co.
Brass, bbls., 40
Canadian Bank of Commerce,
Tin plates, bxs., 288
Dickerson & Co.
Tin, bxs., 3048
Jackson R. D.
Tin, bbls., 5
Leaycraft & Co.
Scrap, copper, pcs., 22
Scrap, brass, pkgs., 7
Phelps, Dodge & Co.
Tin plates, bxs., 10,149
Black taggers, bxs., 90
Vatable H. A. & Son,
Scrap metal, bbls., 16
Pieces, 16
Williams & Guion,
Tin plates, bxs., 183
Order.
Tin plates, bxs., 2566
Tin, bxs., 329
Tin, ingots, 595
Lead, pigs, 3219
Without Bills of Lading.
Tin plates, bxs, 4044

OLD METALS, PAPER STOCK, &c.

There has been but little call for Old Metals during last week, and the market is very quiet. Copper has somewhat declined in price, and is now selling at 19c. per pound. Old Rags and Paper Stock are improving slowly. The call from the mills appears to be rather more active, but as yet there has been only a slight reduction in stocks. Other articles present no material change. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 13c. @ 14c.; Lead, solid, 5½c.; Tea Lead, 5c.; Zinc, 4½c. @ 4¾c.; Pewter, No, 1, 18c.; do., No. 2, 8c. @ 12c.; Spelter, 5¾c., Wrought Iron, 1c.; Sheet do., ¼c.; Cast, do., ⅜c.; Machinery, do., ⅝c.

Rags, &c.—Canvas, Linen, 4¾c. @ 5¼c.; do. Cotton, No 1, 5¾c. @ 6¼c.; No. 2, 2¼c.; White, No. 1, 5¾c.; No. 2, 4c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 5c. @ 5½c.; Gunny Bagging, 1½c.; Jute Butts, 1⅝c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No. 1, 4½ @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1¼c.; Grass Rope, 2¼c. @ 3c.

PHILADELPHIA.

Office of *The Iron Age*, 230 South Fourth st.,
PHILADELPHIA, Dec. 28, 1875.

PIG IRON.—The market remains in about the same condition as last week, and prices are essentially unchanged. There has been a few sales of small lots, but there is no disposition to purchase in quantity, unless special inducements are offered, and while, as stated in our last report, some transactions are at higher prices than our top quotation, others are at lower rates than the lowest quotation. The general figures, however, are as follows: No. 1 Foundry, $23 to $23·50; No. 2, $21, and Gray Forge, $20 to $21, the latter article still rather scarce.

BARS are entirely nominal at 2·4c.

RAILS.—No large sales are reported since our last, but there is considerable inquiry, and indications of quite an active trade after the holidays. The last sales of Steel Rails were at $65 and $67, at the Mills, and of Iron Rails at $45.

OLD RAILS are nominal at $22·50 to $24.

SCRAP.—Nothing doing in Wrought Scrap; the last sales were at $28·50, but there is no disposition to operate to any extent. Cast is again lower, and sales are reported at $16·50 to $18, which may be considered the extreme range.

PITTSBURGH.

PITTSBURGH, Dec. 28, 1875.

PIG IRON.—The long looked and much hoped for improvement has not taken place yet, nor is it to be expected now before the middle of January, and while it is probable that there will be an increased demand by that time, the indications are that the hand-to-mouth policy will be pretty closely adhered to for some time yet. Until there is some evidence of an advance in prices, consumers will continue to buy only to supply immediate actual wants. If they could be convinced that hard pan had actually been reached, they would, no doubt, stock up, and if so, there would be considerable activity in the market, but, until then, trade is likely to continue very quiet. The stock of Charcoal Iron has been very much reduced since last summer, which is owing to the fact that as there was but little difference between the cost of it and coke and bituminous coal, both mills and foundries have been using much more of it, being willing to pay a dollar additional, as it makes a better quality of product. Charcoal may be quoted at $22 to $23, 4 months; No. 1 Foundry, $27 to $29; Cold Blast Car Wheel, $30 to $35 for Eastern, and $40 to $50 for Western. Stone Coal and Coke Irons: No. 1 Foundry, $25 to $26, 4 months; No. 2, $23 to $24; Gray Forge, $21 to $22; White and Mottled, $19 to $20.

MANUFACTURED IRON.—There is but little that is really important to record; trade continues dull, as it nearly always is during this month, but it is hoped and expected that there will be an improvement in the demand next month. Stocks in the hands of both jobbers and consumers, especially in those sections of the country drawing upon Pittsburgh for supplies, are reported as being comparatively light, and there is every reason to look for at least an average spring trade. Prices continue unsatisfactory and unremunerative. Merchant Bars are still quoted at 2·15 to 2·25, 60 days, in a jobbing way, with intimations, although your correspondent cannot vouch for their correctness, of orders for round lots having been accepted as low as a two cent basis for bars.

NAILS.—There is little or no movement, nor is it to be expected at this particular time; the outlook, however, is regarded as being favorable for a good healthy spring trade. Prices unchanged, $2·75 to $2·80, 60 days, with two per cent off for cash.

SCRAP IRON.—The demand continues very light, and dealers report that there is not enough doing to establish quotations.

The Pittsburgh *Commercial*, of the 25th inst., says: The market for raw Irons since our last general review has undergone no change so far as relates to prices. There was, however, a perceptible falling off in regard to sales. In fact, there was nothing done worthy of mention. No improvement in sales is looked for until after the 1st of January. After that time we hope to see business revive with a large increased demand for Pig Iron.

BOSTON.

DEC. 25.—*Pig* holds its own in a listless manner, the inquiry the past week having been even less than a week ago. Quotations range nominally from $19 to $26, covering all the intermediate grades and brands from Forge to No. 1 Foundry. The primary markets continue their flood of uncertain circular remarks upon the stock, supply, consumption and prospective for values, but hereabout no one seems to consider there is any likelihood of an advance this winter. *Bar* is selling in a sharp and lively way, with quotations somewhat steadier at $51·50 than they were a week ago. The retrospect of the market on Merchant Iron is not very comforting, especially if the turn of the past two years and a half is any criterion for the coming year. In July, 1873, Refined Bar Iron was jobbing here at $80; the next January at $75; in July, 1874, at $65; January, 1875, $62; July, 1875, $57·25; and now $51·50 is the value—a drop of over 35¼ per cent. in the 30 months. It would seem certain now that the bottom had been reached; a slight decline further, as here indicated three weeks ago, would lead to a good exporting demand. The gossip of the week has been on the quotations reported on Norway or Norway shapes. There has been more or less apparent irregularity for the past month or two, but not even now is it understood. The quotations on Norway shapes range from $117·50 to $122·50, gold, with some gossiping an opportunity for something in full supply and assortment at even much lower price. *Steel* has been having a moderate trade the past week. There is considerable of an inquiry from agricultural implement makers for quotations on Plow, Harrow Teeth and Rake and Shovel Steel, and possibly a lower range of values may be established by the competition for these orders when the new year comes in. We quote: American Tool, 14c. to 15c.; American Machinery, 9c. to 9½c.; Bessemer Tires, 6¾c. to 7¼c.; Sweet's Excelsior Tire, 8½c. to 12c.; English Tool, 16c. to 18c., gold. *Copper* has had a very dull week. The agitations of the money market affect speculation somewhat, while the small inquiry for manufactured influences the smelters to hold out of the Ingot market until after the new year. Meantime, the price is held very steadily at 23⅝c. to 23½c. For manufacturers we quote New Sheathing, 30c.; Bolts and Braziers, 31c.; Yellow Metal Bolts, 20c. to 28c. *Lead* is dull and steady. Stocks are still reported very light, and lots to arrive not offering. We quote Pig 6c. for Domestic, and 6¾c. to 6½c. for Foreign; Sheet and Pipe Lead, 9c., currency; Tin Lined Pipe, 16½c.; Bar Lead, 9c., less usual trade or 10 per cent. discount. *Antimony* is firm, with a small inquiry at 13½c. *Spelter* is strong and quiet at 7·45, 30 days, and 7·35, prompt cash, all currency. Silesian is dull at 7·75. Sales 50 tons at 6¾c., gold. *Tin*, at the concessions last noted, remains steady. The inquiry is trivial both in Pigs and Plates. We quote: Straits, 19½c.; Banca, 24c.; Refined English, 19½c., gold. Plates are active; we quote Charcoal I. C., $7·50; Coke, $6·75 to $7; and Terne at $6·30 to $6·75, gold.—*Com. Bulletin.*

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, South Charles and Lombard streets, report us the following prices under date of Dec. 28: Business continues ruling depressed, but with some little demand for early wants.

Pumps.

The problem of raising water was the first one of a mechanical or engineering character which the human race was called upon to solve. The most barbarous races, as well as the civilized, are alike compelled to draw water. The means used may be simple or complex, but the necessity is equal in both cases, and in not a few instances the means used are identical. The question of how to raise water is not only the most important but the most frequently recurring of all the mechanical problems which the modern engineer has to solve, and, unlike other things of the kind, this is a question which personally concerns every individual of the community. The earliest device for the purpose was probably an earthen pot or a bag of skin attached to a cord and let down to the spring or into the well.

The shadoof, or common well sweep, seems to have been the next step, and, from drawings found in Egypt, it is proved that this device is at least 3000 years old, and probably even older. Of simple forms of water raising contrivances, such as flutter wheels, chain pumps, Persian wheels—having a number of pots upon a rope or chain—and the simple suction pump, it may be safely said that there is little, if anything, new for the last thousand years or more, modern progress consisting chiefly in improvement in workmanship, better materials and a greater attention to the details.

Very early in the history of the world, animal power was used to assist in the raising of water, and tread wheels, horizontal winding drums, and the direct attachment of animals to the bucket rope, which was led over a pulley, were some of the more common means used. The plumber in dealing with the question of water raising has usually to depend upon manual labor, or upon some motor like wind, steam or hot air engines, or the like, animal power being rarely employed, because a "horse-power," or similar machine for utilizing the force of animals, usually costs more than a small steam engine or other prime mover of equal power.

Men, taken at an average, are equal to the production of one-fifth of a horse-power for 10 hours per day. A strong man has, for a few minutes at a time, exerted a force equal to more than half a horse-power, lifting a weight of 18,000 lbs. one foot high in a minute, but this could not be kept up. In estimating the quantity of water required in any given job, a man's power can be estimated as equal to the raising of 4500 lbs. one foot high per minute. At this rate, a pump with a 4 inch bore and one-half inch pipe, delivering 40 gallons per minute 16 feet high, would require the full strength of an able bodied man. Half the quantity could be lifted to twice the hight—that is, 20 gallons per minute 32 feet high, and so on. As the length of the pipe increases, the quantity delivered would be diminished, but this diminution would be very small, and would not especially affect the result. In putting in a pump to be worked by hand, a mistake is often made in choosing one in which the leverage is so large that the hand does not have a decidedly perceptible resistance, and is obliged to travel over a very great distance to do the work. The books give a resistance of 30 lbs., and a speed of 2½ feet per second, as the greatest rate of speed at which work can be kept up. The weight, we should judge, was about right, but we think that the speed is much greater than can be conveniently attained in pumping. We should think that a double 18 inch stroke would be much nearer a practicable rate. That is 3 feet per second, but only half of the time performing work.

When a man has to work a pump for a short lift, we see no objection to the use of a good sized barrel, so as to obtain a fair amount of resistance. This reduces the time necessary for pumping a given quantity of water, though it makes the work a little harder. Where a pump has to be used by women and children, especially if the whole distance through which the water is carried is considerable, a pump which works easily is absolutely necessary. In such cases a pump with a long leverage and a comparatively small bore must be selected. For a well or cistern from which a great deal of water is to be drawn by different persons, as, for instance, one by which a large school is supplied, it is necessary that the pump should deliver a large quantity of water at each stroke. No one individual pumps more than one or two pails full at a time, and it makes little difference whether the whole force is expended in two or three stokes or in seven or eight. It would make a vast saving in time, however, when the pail is filled in two strokes. In setting up a pump that delivers a great quantity of water at each stroke, care should be taken to have a large nozzle and a free water way, otherwise the stream will be too violent and spatter and splash. This is a very common fault with many pumps when they are worked rapidly. The distance to which water can be raised by the common lifting pump varies with the hight above the sea level, and also with the pressure of the atmosphere. At the sea level the column of water that the atmosphere will support is about 33 feet in hight, and a pump will draw water, as it is called, this distance, but it must be remembered that the force which sends the water into the pump at this hight is so small as to be almost balanced by the weight of the water; hence a lifting pump would deliver water very slowly, drawing it this distance. The nearer the pump barrel is to the surface of the water, the more rapidly the pressure of the atmosphere forces the water through the suction pipe. Hence, many manufacturers in putting up a pipe never put it further than 25 feet from the water level. This sends the water to the pump with a force nearly equal to a head of 7 or 8 feet. Where a greater distance is unavoidable as, for example, where the suction pipe must be very long, and where the pump has a large bore and is worked rapidly, a vacuum chamber is very valuable in preventing the water from "breaking" in the pipe. With pitcher and other pumps having very large cylinders, the suction pipe can rarely be made large enough to supply the pump, and when working fast there is a loss both of power and capacity. Our experience with pumps leads us to think that a vacuum chamber is very desirable at any time. We have seen a pump, of say 2 or 2½ inch bore, supplied through a long half inch pipe fitted with a vacuum chamber, and found that, by the most rapid pumping, it was almost impossible to "break" the water in the suction pipe—the chamber in this case drawing water on the down stroke of the bucket and forming a reservoir from which the pump can draw on the up stroke.

In putting up pumps plumbers frequently pay too little attention to them. When a pump is ordered, care should be taked to obtain a pump suitable for the work to be done, neither too large nor too small, and the connections should by all means be properly made. Not long since a boiler pump was returned to a manufacturer because it would not work, and, on examination, it was found that the suction pipe had been put on to the delivery opening and the delivery pipe on the suction. It was, of course, little wonder that the engineer could not get his boiler full of water. It often happens that a house pump is put up in such a way that the water cannot be made to run down. This may happen through accident or design. Where, on the approach of cold weather, the plumber intentionally leaves the house pump in such a condition that the water cannot be allowed to run out of the pipe, he should be held responsible for the damage resulting. Such things should always be discountenanced, as they bring the trade into bad repute. If it is done in ignorance or carelessness it is also to be regretted. In the next article of this series we will give some useful data in regard to pumps and their efficiency.

Until within a few years the form of pump in common use consisted of a single log of wood, bored out, and provided with a spear, two valves and a spout. The bark was removed, but there was seldom any attempt to shape the log, or reduce its size, unless, perhaps, around the top. The objection to this form of pump was found in the fact that the wood decayed, and the inside of the pump barrel disintegrated. The surface of the wood also became slimy, and after a few years' use the water would be found charged with particles of wood fiber, and fungiod growths. Their durability was surprising, however, and in spite of the objections named, water was delivered by them in very pure condition—at least, until the pumps had become old. The selection of the log determined in a great degree the life of the pump. But, while in some respects admirably adapted to outdoor wells of moderate depth, they were not efficient in delivering water from wells of 60 feet or more in depth, as the power required to work them was out of all proportion to the amount of water raised. The reason for this was the necessarily large size of the bore, and consequent heavy load always on the plunger. While still in limited use, however, wooden pumps of this kind have been to a great extent superseded by lighter and cheaper ones made by machinery.

Following the primitive form of wood pump, came the chain pump, which was also adapted to raising water from wells of moderate depth. This, although one of the oldest form of pumps known, has come into use in this country within twenty years. It is very cheap, simple, durable, and will rarely freeze in the coldest climate. A chain pump will raise water with great rapidity—faster, perhaps, from wells of moderate depth, than any other mechanical device in use. In deep wells, however, the labor of raising water by the chain is very severe, as there is a long column of water to be supported, and the leakage is very considerable. The waste of power increases as the tubing wears, giving the chain free play from side to side. The only really objectionable feature of this pump is the zinc coating which it is commonly considered necessary to give the chain. The chances of zinc poisoning from this cause are very small, but we have heard of instances in which zinc poisoning has been traced to this cause and proved by crucial tests.

Since the day of the chain pump, the iron pump has come into more general use than any other device for lifting water. What is commonly known as the cistern pump, is made by all pump manufacturers and has become standard. In their general features all pumps of this class are alike, consisting of a cast iron cylinder, with spout; a base for securing it to the platform upon which it stands; a brake and its fulcrum, or stand; a piston, piston rod and valves. These pumps are in use in nearly all parts of the world, and have been for some years an important article of export. In this country they are used by the million, and, all things considered, they are the cheapest, most durable and most efficient hand pumps ever made. In these pumps the diameter of bore ranges from 2 to 3½ inches, increasing by quarters of an inch. The pipes used with them are from three-quarter inch to 2¼ inches, and may be of any kind known to the trade. The following table shows the average efficiency of good pumps of this pattern, worked moderately with one hand:

Diameter of bore.	Gallons per min.
2 in.	6
2¼ "	8
2½ "	12
2¾ "	15
3 "	22
3¼ "	26
3½ "	30

The size of pipes used with pumps of this class should be determined with reference to the hight to which the water has to be raised. The following table will be useful to those who put in pumps and make the connections.

Size of bore.		Size of pipe.
2 in.	For any ordinary hight	1¼ in.
2¼ "	Under 18 ft.	1¼ "
	Over 18 ft.	1 "
2½ "	Under 18 ft.	1 "
	Over 18 ft.	1¼ "
2¾ "	Under 18 ft.	1¼ "
	Over 18 ft.	1½ "
3 "	Under 18 ft.	1½ "
	Over 18 ft.	1¾ "
3¼ "	Under 18 ft.	1¾ "
	Over 18 ft.	2 "
3½ "	Under 18 ft.	2 "
	Over 18 ft.	2¼ "

Pumps of this class weigh from 15 to about 50 lbs. each. Leather valves and packing are commonly used, but brass valves can be had from the makers when hot water is to be pumped. Properly cared for, these pumps will wear for an indefinite period. Various parts may get out of order, and persons inexperienced in such matters are apt to think that a new pump is needed. Commonly, this is a mistake. Pumps of this class are made on the system of interchangeability of parts, and any part which wears out or breaks can be replaced at small cost. The most expensive part of a small size of this style of pump—the cylinder—costs less than half the price of a new pump, and $1·50 will replace all the parts likely to wear out in many years' service. A few cents spent on new leather as often as may be necessary, and an occasional tightening of screws and nuts, will extend the life of such a pump indefinitely. If a pump "runs down" when left standing for a few minutes, and water must be poured into the barrel to make the piston suck, it needs attention. The repairs needed to correct these defects are easily made, but if neglected the pump will rapidly wear out.

In the succeeding parts of this series other forms of apparatus in common use for raising water will be considered.

(To be continued.)

The new water works for Virginia City will not be completed before June, 1876. The cost will be $130,000.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Dec. 29, 1875.

The past week, with the interruption of Christmas, has been a dull one in the financial markets. The money market proper shows a fair degree of firmness, and the rate on call loans is 7 per cent. The discount rate on prime mercantile paper with two names is 6@8½ per cent.

The gold market has been quite steady during the week, and the premium has fluctuated within narrow limits. On Monday the Assistant Treasurer began the payment of the January interest, amounting to $25,039,734. This will render coin abundant for the time, and tend to keep the premium steady. The following shows the highest and lowest daily quotations since our last report:

	Highest.	Lowest.
Thursday	113⅛	112⅛
Friday	113⅛	113
Saturday	—	—
Monday	113	112⅝
Tuesday	113	112¾
Wednesday	113⅛	113

Government bonds are strong at home and abroad. Desirable railroad securities are strong and in good investment demand. We give below the closing quotations of governments.

The stock market was weak and uneven until Monday, when it became stronger, and has since continued firm. The principal dealings have been in Lake Shore, Erie, Pacific Mail, Western Union, St. Paul and Northwestern.

The movements of the week in foreign trade are shown in the following tables:

IMPORTS.

	1873.	1874.	1875.
Total for week	$3,919,882	$2,965,573	$2,372,533
Prev. reported	373,987,227	377,389,660	315,625,161
Since Jan. 1	$377,907,109	$380,355,233	$317,997,694

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Brass goods	4	$309
Bronzes	5	994
Chains and anchors	12	502
Cutlery	16	4,701
Guns	62	9,511
Hardware	8	1,094
Iron, other, tons	940	50,703
Lead, pigs	1,610	9,946
Metal goods	49	6,127
Nails	2	607
Needles	12	7,054
Per. caps	7	1,041
Saddlery	3	676
Steel	785	6,093
Silverware	4	2,104
Tin, boxes	8,650	50,979
Wire	1	624

EXPORTS, EXCLUSIVE OF SPECIE.

	1873.	1874.	1875.
Total for week	$6,075,750	$5,256,477	$3,739,424
Prev. reported	293,873,871	281,672,623	241,767,862
Since Jan 1	$299,349,621	$286,929,100	$255,507,286

EXPORTS OF SPECIE.

Total for the week	$12,529
Previously reported	12,727,761
Total since January 1, 1875	$12,740,290
Same time in 1874	6,251,725
Same time in 1873	18,779,929
Same time in 1872	5,547,311

The bank statement for the week shows a loss in total reserve of only $544,200—this notwithstanding a loss of $1,198,300 in legal tender notes. By reason of the reduction in liabilities—the deposits having fallen $3,595,200—there is a gain in the surplus reserve of $354,600. In other words, the banks have a surplus reserve of $7,361,900 this week, against $7,007,300 last week. It is safe to assume, however, that the legal tender average is a falling one; but, on the other hand, the specie average is a rising one. The following is a comparison of the bank averages for the past two weeks:

	Dec. 18.	Dec. 25.	Differences.
Loans	$265,512,500	$263,638,500	Dec. $1,829,000
Specie	16,105,800	16,759,900	Inc. 654,100
Legal tend's	41,960,500	40,762,200	Dec. 1,198,300
Deposits	201,236,000	200,640,800	Dec. 3,595,200
Circulation	19,028,600	18,950,700	Dec. 77,900

Government bonds at the close were quoted as follows:

	Bid.	Asked.
U. S. Currency 6's	122½	123
U. S. 6s 1881, reg	119¼	119½
U. S. 6s. 1881, cou	123¾	124⅛
U. S. 5-20 1862, reg (Called)	—	—
U. S. 5-20 1862, con (Called)	—	—
U. S. 5-20 1864, reg (Called)	114	—
U. S. 5-20 1864, cou (Called)	114	—
U. S. 5-20 1865, reg	115⅛	115¾
U. S. 5-20 1865, cou	115⅜	116
U. S. 5-20 1865, new	116⅜	117
U. S. 5-20 1865, con	120⅛	120¾
U. S. 5-20 1867, reg	119	119¼
U. S. 5-20 1867, cou	122⅛	122⅝
U. S. 5-20 1868, reg	119	119½
U. S. 5-20 1868, con	122⅛	122⅞
U. S. 10-40 reg	117⅛	117¾
U. S. 10-40 con	117⅝	118
U. S. 5s. 1881, reg	116⅜	117
U. S. 5s, 1881, cou	116¾	117

The latest sales and closing quotations of stocks were as follows:

	Bid.	Asked.
Atlantic & Pacific R. R. Preferred	3¾	4
Atlantic and Pacific Telegraph	18	19
Chicago & Northwestern	89	89½
" " Pref.	56½	56¾
Chicago, Rock Island and Pacific	104¾	104⅞
Col., Chic. & Ind. Cent	3⅛	3¾
Clev., Col., Cin. & Ind's	58¾	59⅛
Cleveland and Pittsburgh	89¾	89¾
Chicago & Alton	97¾	98
" " Pref	105¾	106
Consolidation Coal	45¼	46¼
Canton	37½	40
Del. Lack. and Western	120½	120⅝
Delaware & Hudson Canal	124¼	124
Adams Express	101½	102½
American Express	56⅜	56¾
United States Express	62	63
Wells, Fargo & Co. Express	85	86
Erie	15⅛	15¾
Harlem	130½	131
Hannibal & St. Joseph	20½	21
" " Pref.	27¼	28
Illinois Central	97	97⅛
Kansas Pacific	13	14
Kansas & Texas	6	7
Lake Shore	59¼	59¼
Michigan Central	58⅛	58¾
Morris & Essex	101¾	102¾
Milwaukee & St. Paul	35⅛	35¾
" " Pref.	66¾	66¾
Mariposa	8½	9½
" " Pref.	9	10
New York Central	104¼	105
New Jersey Central	105¼	106
Ohio & Mississippi	16⅞	17⅛
Pacific Mail	39¼	39⅜
Panama	125	127
Pittsburgh & Fort Wayne	97	98
Pacific of Missouri	11⅜	11⅝
Quicksilver	17½	18¾
" Pref.	23	24
St. L., Kan. City Northern	4	4⅛
" Pref.	22	23⅛
Tol., Wabash & Western	3¼	3⅜
Union Pacific	74	74⅛
Western Union Telegraph (ex'd)	73¾	73½

GENERAL HARDWARE.

The Hardware trade participates in the usual dullness common to the holiday season. A good deal of preparation for the coming year, in the revision of lists and discounts, is going on, and some of these which are now ready will not be distributed until after the 1st of January.

The American Screw Company will, at an early day, make a further reduction in the price of Gimlet Pointed Screws.

The Tack manufacturers held a meeting in Boston to-day, and although the particulars have not reached us, we are able to say that the discount off Half and Full Weight Tacks has been increased, and some other changes adopted, to go into effect January 1st.

In Foreign Hardware there is little doing, and prices continue unchanged.

The Nail market continues, as far as value and demand is concerned, in much the same condition as at our last writing. We hear of a good deal of inquiry from purchasers of large lots, and the tone of the market is decidedly strong. We continue to quote 10d. at $3 per keg, net; for lots of 200 kegs and over this price could be shaded a trifle.

Henry Disston & Sons will issue in a day or so their revised list and discount sheet for Saws and other goods of their manufacture.

J. Clark Wilson & Co. quote Wellington Mills Genuine London Emery at 10 cents per pound for Grain and 8 cents per pound for Flour, net.

The Meriden Cutlery Co., No. 43 Chambers street, have made the following changes in their price list:

1075, Carvers	from $2·75 to	$3·00 per pair.
1075, "	" 3·35 to	3·60 per set.
476, Nut Picks	" 3·75 to	4·75 per doz.
4760, "	" 5·25 to	6·25 per doz.

The Old Colony Rivet Works will issue the following circular on the 1st proximo:

Office of the OLD COLONY RIVET WORKS,
KINGSTON, MASS., Jan. 1, 1876.

GENTLEMEN: On and after this date the discounts on Norway Iron Rivets of my manufacture will be as follows, viz.:

Black and Tinned, in M packages.....dis. 40 %
Rivets in bulk..... " 20 %
To jobbing and commission houses 7½ per cent. additional.

As a first quality article of Norway Iron Rivets cannot be produced at the prices heretofore ruling, to avoid loss it becomes a necessity either to advance rates or to manufacture an inferior or second quality article.

Believing that the interests of both my patrons and myself will be the better served by a maintenance of quality, I have adopted this course.

With thanks for past patronage, and desiring to serve you in the future as in the past with a first-class article, I am, very truly, yours,

JAS. L. HALL, Prop.

Factory, Kingston, Mass.; Warehouse, 34 Warren st., New York.

The Ansonia Brass and Copper Co. have issued the following circular:

NEW YORK, Dec. 14, 1875.

DEAR SIRS: We beg leave to inform you that the damage to our copper mill by fire, on December 11th, will be quickly repaired, and that, meanwhile, we have made arrangements by which we can fill orders for Copper of every size and description with the usual dispatch.

We have constantly on hand a large stock of Braziers', Bolt and Sheathing Copper, Tinned Copper, Patent Planished Copper, Soldering Coppers, Copper Bottoms, etc., together with the products of our brass mill, clock factory and iron wire mill, for which we will be glad to receive orders.

We are, very respectfully, yours,
ANSONIA BRASS & COPPER CO.

E. M. Boynton occupies the whole of the 17th page this week with an advertisement illustrating his Patent "Lightning" Saws and other specialties of his manufacture. We are informed that the demand for export for these goods has attained this year very handsome proportions.

BRITISH IRON MARKET.

(Specially reported by cable for The Iron Age.)

WEDNESDAY, Dec. 29, 1875.

Scotch Pig.—The returns for the past week show a very large increase in the shipping demand over the corresponding period of last year, and quotations for makers' irons have advanced several shillings per ton over the figures quoted by cable last week. The following are quotations for makers' irons.

Gartsherrie No. 1	78/6
Coltness No. 1	79/6
Glengarnock No. 1	71/
Eglinton No. 1	65/6

Manufactured Iron and Rails are without change to report.

IRON.

American Pig.—There is almost nothing to report. During the week transactions have been small and few, and prices are unchanged. The Thomas Iron Company report the sale of 700 tons No. 1 Foundry, in lots, at $23; 200 tons No. 2 Foundry at $21; and 100 tons Gray Forge at $20. We continue our quotations without change.

Scotch Pig.—The market has been dull since our last, and there are no important sales to note. The stock here is about 1500 tons. We quote Coltness, $33; Glengarnock, $31; Gartsherrie, $32·50; and Eglinton, $29·50@$30.

Rails.—The recent large sales of Steel Rails, and further negotiations pending, have been the principal topic of interest. We quote American Iron, at mill, $42@$46.

Old Rails.—We continue our quotation of $22·50; but this price is purely nominal, as it is above the views of buyers and below those of the majority of holders. There have been no sales.

Scrap.—There is no new feature in Wrought Scrap Iron. We quote $30.

METALS.

Copper.—Not much activity was to be expected during the last week of the year, which proved a dull one, indeed, sales of Lake Superior being restricted to 250,000 pounds at 23¼c. @ 23⅜c., the inside figure being the closing one, without much demand even at this. The general business outlook for the ensuing year is a promising one, if anything. In a letter of the New York correspondent of the London *Economist* we find the following passage, after an enumeration of the failures and private arrangements which have occurred in this country during the past three years: "It seems evident that in the United States the process of purification has been nearly completed, and that a real revival of industry, founded on real values, is becoming an actual, or at least a near, event." In Europe and elsewhere the process of purification is still going on vigorously, and we shall, in all likelihood, be the first from among the commercial nations whose trade will be resuscitated on a safe basis. This basis, we presume, will be reached when improved real estate shall have touched bottom; we shall be able to form some opinion on this subject early in spring. Returning confidence in real estate values will start the building trade, and all metals will be favorably influenced thereby. Such at least is the impression among people in the metal trade, and we trust that these expectations may be fulfilled. In our last report we gave some statistics from the *Mining Gazette*, of Houghton; the following explanation is added in reference thereto: "The table published in last week's issue was from the books of the smelting works at this point, and gave the figures of the Ingot Copper and mineral that passed through their hands. As some of the mines get a portion of their mineral smelted here and at Detroit, it is well to state, in order that the table given by us may not be misunderstood, that the Quincy shipped, during the season of navigation of 1875, 1704 tons 1395 pounds of mineral from the mine, and that the Atlantic sent from the mine, from the close of navigation of 1874 to the close of navigation, 1875, 1049 tons 1798 pounds of mineral. In the table referred to, the Atlantic was credited with shipping only 120 tons 1754 pounds of Ingot Copper, while the Quincy shipments for the year were omitted." London is unchanged at £81. 10/ for Chili Bars, and £88 Best Selected. The manufactures of Copper are steady, as follows: New Sheathing, 30c.; Bolts and Braziers', 31c.; Nails, 38c. @ 39c.; Bronze and Yellow Metal Sheathing, 21c.; Yellow Metal Bolts, 28c., and do. Nails, 21c., net cash.

Tin.—Our market has relapsed into a quiet mood, though a tolerably firm one, at the following quotations in gold, large lots: Straits, 19¼c. @ 19½c.; English Refined, 19¼c.; English Common, 19c., and Banca, 23½c. @ 24c. London to-day wires Straits, £81. 10/, and Singapore has from $23·12½ risen to $23·50, and is now wired $23·37½, with a reduced stock. Later telegraphic advices from the Straits settlements are decidedly favorable to the English, who seem to meet with hardly any resistance in their operations against the turbulent Malays. Accounts are to hand by mail from Australia expatiating on the abundance of Tin in Van Diemen's Land (Tasmania). The ore at the same time seems to be of unusual richness. Advices from London by mail report shipments of English Tin, from England, to have been 318 tons in November, 106 of which to this country. The distribution of Tin to consumption from New York and Boston during the past six months has been 1564 tons, against 2574 the preceding six months, making a total for the year of 4138 tons, against 4629 and 4313 in 1874 and 1873. This is a decided disappointment, inasmuch as it was hoped that the deliveries would continue on a liberal scale during the remainder of the year. Tin Plates have been quiet but firm. We quote, gold, per box, in large lots, ordinary brands: Charcoal Bright, $7·50@$7·75; ditto Ternes, $7@$7·25; Coke Tin, $6·62½@$6·75, and ditto Ternes, $6·25@$6·50. In England orders abound.

Lead—Presents no new features, and the week has been pretty much the dullest of the year. Sales have been confined to 50 tons Common Domestic at 5·90c., gold. Soft Missouri, here, we quote 7¾c., currency, and Foreign, 7½c., gold. Europe has again risen 5/, and remained firm at the improvement at last accounts. The manufactures of Lead are quiet and unchanged.

Spelter and Zinc.—Domestic Spelter has been stagnant at 7·40c., currency, less the discount, while of Foreign nothing sold, either on the spot or futures, the stock being 145 tons C. G. H. and W. H., which may be quoted 7·27½c. @ 7·37½c., gold. Import of Foreign during the year but 540 tons, against 1050 and 2525 the previous two. In Europe the metal remains scarce, and a steady demand causes it to still tend upward. *Sheet Zinc.*—Nothing is going on therein, and we quote the article 8¾c. @ 9c., gold.

Antimony.—"Cookson" brand is scarce, and concentrated in one hand, bringing 14½c., gold, while other brands in better supply command 14¼c., gold, and no more. Market quiet.

COAL.

The Coal trade, both Anthracite and Bituminous, may now be quoted as being very dull. The season for shipping to many of the ports is now over, and the stocks on hand are quite ample for supplying the current wants. The programme for next season will, no doubt, be arranged upon the same basis as now prevails. From the latest dispatches from Philadelphia, we are informed that the leading Coal companies in the Wyoming region have agreed upon a total suspension for one month, to take effect on the last day of December.

At a meeting of the New York Lehigh Coal Exchange, held Dec. 20th, the following prices were adopted for January shipments at Elizabethport, Port Johnson and Hoboken:

Lump	$5·55
Broken	5·55
Egg	5·65
Stove	6·10
Chestnut	5·10

The quantity of Coal sent from the Schuylkill region for the past week was, by rail, 83,507 tons; by canal, 1727 tons; total, 85,234 tons, against 67,661 tons for the corresponding week of last year. Increase, 7583 tons. The quantity sent so far for the year beginning December 1 was 236,445 tons, against 290,663 tons for the corresponding period last year. Decrease, 54,218 tons.

The quantity sent from all the regions for the week was: 398,801 tons Anthracite, and 279,781 tons Bituminous; total, 678,581 tons, against 284,826 tons Anthracite, and 24,857 tons Bituminous; total, 309,683 tons for the corresponding period of last year. Increase of Anthracite, 113,975 tons; increase of Bituminous, 254,924 tons. Total increase, 368,899 tons.

The quantity sent from all the regions so far this year was Anthracite 20,116,645 tons, and Bituminous, 3,856,334 tons; total, 23,972,979 tons, against 20,032,095 tons Anthracite, and 3,540,769 tons Bituminous; total, 23,572,864 tons for corresponding period of last year. Increase, 400,115 tons.

We quote as follows: Anthracite, $4·95@$6·10; Cumberland, $6·25@$6·75; West Virginia, $6·75; James River Steam, $6·25; James River Carbonite, $9@$9·50; Kanawha House, $11·50; American Gas, $6·75@$7·25; American Cannel, $12@$14; Pennsylvania and Westmoreland, $6·75; Newburgh Orrel, $6·50; Sterling Ohio, $10; Ince Hall, $17@$18; Liverpool House Cannel, $17; Liverpool Gas, $12; Newcastle Gas, $7; Scotch, $7·60.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending Dec. 28, 1875:

Hardware.

Brown Bros. & Co.
Per. caps, cs., 1
Bamberger & Oppenheimer,
Cases, 12
Blumenthal I. & A.
Metalware, cs., 2
Boker Hermann & Co.
Iron ware, cs., 10
Calhoun, Robbins & Co.
Cases, 1
Frasse P. A. & Co.
Metalware, cs., 1
Mdse. pkgs., 2
Flesch A. & D. & Co.
Cases, 4
Fuller Bros.
Chains, cks., 6
Feldmann & Decker,
Cases, 31
Field A. & Co.
Casks, 7
Cases, 10
Chains, cks., 37
Gilespie J. D. C.
Cases, 7
Hutchinson J. W.
Arms, cs., 7
Knauth, Nachod & Kuhne.
Cases, 1
Kaldenberg J.
Cases, 1
Packages, 3
Lau & Garlichs,
Mdse. pkgs., 8
Merchants Dispatch Co.
Wire rope, pkgs., 5
Mayer Robert & Co.
Ironware, cs., 3
Meier Geo. & Co.
Ironware, cs., 5
Peters Bros.
Cutlery, cs., 4
Rosenfeld Bros.
Hardware, cs., 2
Schoverling & Daly,
Mdse. pkgs., 2
Sawyer J.
Wire rope, coils, 2
Tillotson L. G. & Co.
Galv. wire, lots, 111
Van Wart & McCoy,
Mdse. pkgs., 86
Wiebusch & Hilger Mfg. Co.
Cases, 7
Casks, 9
Anvils, 96
Packages, 6
Chains, cks., 2
Wolfie S. N. & Co.
Ironware, cks., 4
Windmuller L. & Roelker
Arms, cs., 8
Order.
Cutlery, cs., 1
Files, cks., 6
Gun barrel molds, cs., 10
Packages, 3

Iron.

Hamlin & Son,
Tons, 25
Henderson Bros.
Pig, tons, 100
Lang W. Bailey & Co.
Bars, 276
Bundles, 165
Morton, Bliss & Co.
Scrap, tons, 62
Phelps, Dodge & Co.
Plates, bxs., 150
Vatable H. A. & Son,
Scrap, tons, 100
Whitney A. R. & Bro.
Wrought, flues, 340
Order.
Pig, tons, 400
Scrap, cs., 50
Spiegel, lots, 1

Steel.

Benedict E.
Cases, 4
Brown Wm.
Cases, 6
Bundles, 158
Frith Edward,
Cases, 22
Haigh J. Lloyd,
Wire, bdls., 87
Hogan John.
Casks, 7
Cases, 14
Prosser Thos. & Sons,
Wheels, 4
Tire forgings, 68
Pierson & Co.
Bessemer, bdls., 222
Sulzbacher & Hymane,
Wire rollers, 50
Pieces, 8
Cases, 6
Packages, 80
Woodford W. O.
Cases, 83
Bundles, 13
Order.
Scrap leaf, tons, 55
Bundles, 75

Metals.

Byrne Joseph & Co.
Tin plates, bxs., 550
Bruce & Cook,
Tin plates, bxs., 400
Coe Brass Co.
Brass, bbls., 40
Canadian Bank of Commerce,
Tin plates, bxs., 288
Dickerson & Co.
Tin, bxs., 3048
Jackson R. D.
Tin, bbls., 5
Leaycraft & Co.
Scrap, copper, pcs., 22
Scrap, brass, pkgs., 7
Phelps, Dodge & Co.
Tin plates, bxs., 10,149
Black taggers, bxs., 90
Vatable H. A. & Son,
Scrap metal, bbls., 16
Pieces, 16
Williams & Guion,
Tin plates, bxs., 183
Order.
Tin plates, bxs., 2566
Tin, bxs., 329
Tin, ingots, 595
Lead, pigs, 3219
Without Bills of Lading.
Tin plates, bxs, 4044

OLD METALS, PAPER STOCK, &c.

There has been but little call for Old Metals during last week, and the market is very quiet. Copper has somewhat declined in price, and is now selling at 19c. per pound. Old Rags and Paper Stock are improving slowly. The call from the mills appears to be rather more active, but as yet there has been only a slight reduction in stocks. Other articles present no material change. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 13c. @ 14c.; Lead, solid, 5½c.; Tea Lead, 5c.; Zinc, 4¼c. @ 4½c.; Pewter, No, 1, 18c.; do., No. 2, 8c. @ 12c.; Spelter, 5¼c., Wrought Iron, 1c.; Sheet do., ¼c.; Cast, do., ½c.; Machinery, do., ¾c.

Rags, &c.—Canvas, Linen, 4¾c. @ 5¼c.; do. Cotton, No 1, 5¾c. @ 6½c.; No. 2, 2½c.; White, No. 1, 5¾c.; No. 2, 4c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 5c. @ 5½c.; Gunny Bagging, 1½c.; Jute Butts, 1¾c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No 1, 4¼ @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1¼c.; Grass Rope, 2¼c. @ 3c.

PHILADELPHIA.

Office of *The Iron Age*, 230 South Fourth st.,
PHILADELPHIA, Dec. 28, 1875.

PIG IRON.—The market remains in about the same condition as last week, and prices are essentially unchanged. There has been a few sales of small lots, but there is no disposition to purchase in quantity, unless special inducements are offered, and while, as stated in our last report, some transactions are at higher prices than our top quotation, others are at lower rates than the lowest quotation. The general figures, however, are as follows: No. 1 Foundry, $23 to $23·50; No. 2, $21, and Gray Forge, $20 to $21, the latter article still rather scarce.

BARS are entirely nominal at 2·4c.

RAILS.—No large sales are reported since our last, but there is considerable inquiry, and indications of quite an active trade after the holidays. The last sales of Steel Rails were at $65 and $67, at the Mills, and of Iron Rails at $45.

OLD RAILS are nominal at $22·50 to $24.

SCRAP.—Nothing doing in Wrought Scrap; the last sales were at $28·50, but there is no disposition to operate to any extent. Cast is again lower, and sales are reported at $16·50 to $18, which may be considered the extreme range.

PITTSBURGH.

PITTSBURGH, Dec. 28, 1875.

PIG IRON.—The long looked and much hoped for improvement has not taken place yet, nor is it to be expected now before the middle of January, and while it is probable that there will be an increased demand by that time, the indications are that the hand-to-mouth policy will be pretty closely adhered to for some time yet. Until there is some evidence of an advance in prices, consumers will continue to buy only to supply immediate actual wants. If they could be convinced that hard pan had actually been reached, they would, no doubt, stock up, and if so, there would be considerable activity in the market, but, until then, trade is likely to continue very quiet. The stock of Charcoal Iron has been very much reduced since last summer, which is owing to the fact that as there was but little difference between the cost of it and coke and bituminous coal, both mills and foundries have been using much more of it, being willing to pay a dollar additional, as it makes a better quality of product. Charcoal may be quoted at $22 to $23, 4 months; No. 1 Foundry, $27 to $29; Cold Blast Car Wheel, $30 to $35 for Eastern, and $40 to $50 for Western. Stone Coal and Coke Irons: No. 1 Foundry, $25 to $26, 4 months; No. 2, $23 to $24; Gray Forge, $21 to $22; White and Mottled, $19 to $20.

MANUFACTURED IRON.—There is but little that is really important to record; trade continues dull, as it nearly always is during this month, but it is hoped and expected that there will be an improvement in the demand next month. Stocks in the hands of both jobbers and consumers, especially in those sections of the country drawing upon Pittsburgh for supplies, are reported as being comparatively light, and there is every reason to look for at least an average spring trade. Prices continue unsatisfactory and unremunerative. Merchant Bars are still quoted at 2·15 to 2·25, 60 days, in a jobbing way, with intimations, although your correspondent cannot vouch for their correctness, of orders for round lots having been accepted as low as a two cent basis for bars.

NAILS.—There is little or no movement, nor is it to be expected at this particular time; the outlook, however, is regarded as being favorable for a good healthy spring trade. Prices unchanged, $2·75 to $2·80, 60 days, with two per cent off for cash.

SCRAP IRON.—The demand continues very light, and dealers report that there is not enough doing to establish quotations.

The Pittsburgh *Commercial*, of the 25th inst., says: The market for raw Irons since our last general review has undergone no change so far as relates to prices. There was, however, a perceptible falling off in regard to sales. In fact, there was nothing done worthy of mention. No improvement in sales is looked for until after the 1st of January. After that time we hope to see business revive with a large increased demand for Pig Iron.

BOSTON.

DEC. 25.—*Pig* holds its own in a listless manner, the inquiry the past week having been even less than a week ago. Quotations range nominally from $19 to $26, covering all the intermediate grades and brands from Forge to No. 1 Foundry. The primary markets continue their flood of uncertain circular remarks upon the stock, supply, consumption and prospective for values, but hereabout no one seems to consider there is any likelihood of an advance this winter. *Bar* is selling in a sharp and lively way, with quotations somewhat steadier at $51·50 than they were a week ago. The retrospect of the market on Merchant Iron is not very comforting, especially if the turn of the past two years and a half is any criterion for the coming year. In July, 1873, Refined Bar Iron was jobbing here at $80; the next January at $75; in July, 1874, at $65; January, 1875, $62; July, 1875, $57·25; and now $51·50 is the value—a drop of over 35¼ per cent. in the 30 months. It would seem certain now that the bottom had been reached; a slight decline further, as here indicated three weeks ago, would lead to a good exporting demand. The gossip of the week has been on the quotations reported on Norway or Norway shapes. There has been more or less apparent irregularity for the past month or two, but not even now is it understood. The quotations on Norway shapes range from $117·50 to $122·50, gold, with some gossiping an opportunity for something in full supply and assortment at even much lower price. *Steel* has been having a moderate trade the past week. There is considerable of an inquiry from agricultural implement makers for quotations on Plow, Harrow Teeth and Rake and Shovel Steel, and possibly a lower range of values may be established by the competition for these orders when the new year comes in. We quote: American Tool, 14c. to 15c.; American Machinery, 9c. to 9½c.; Bessemer Tires, 6¾c. to 7¼c.; Sweet's Excelsior Tire, 8½c. to 12c.; English Tool, 16c. to 18c., gold. *Copper* has had a very dull week. The agitations of the money market affect speculation somewhat, while the small inquiry for manufactured influences the smelters to hold out of the Ingot market until after the new year. Meantime, the price is held very steadily at 23⅜c. to 23½c. For manufacturers we quote New Sheathing, 30c.; Bolts and Braziers, 31c.; Yellow Metal Bolts, 20c. to 29c. *Lead* is dull and steady. Stocks are still reported very light, and lots to arrive not offering. We quote Pig 6c. for Domestic, and 6¾c. to 6½c. for Foreign; Sheet and Pipe Lead, 9c., currency; Tin Lined Pipe, 16½c.; Bar Lead, 9c., less usual trade or 10 per cent. discount. *Antimony* is firm, with a small inquiry at 13½c. *Spelter* is strong and quiet at 7·45, 30 days, and 7·35, prompt cash, all currency. Silesian is dull at 7·75. Sales 50 tons at 6¾c., gold. *Tin*, at the concessions last noted, remains steady. The inquiry is trivial both in Pigs and Plates. We quote: Straits, 19½c.; Banca, 24c.; Refined English, 19½c., gold. Plates are active; we quote Charcoal I. C., $7·50; Coke, $6·75 to $7; and Terne at $6·30 to $6·75, gold.—*Com. Bulletin.*

BALTIMORE.

MESSRS. WYETH & BROTHER, Iron and Steel merchants, South Charles and Lombard streets, report us the following prices under date of Dec. 28: Business continues ruling depressed, but with some little demand for early wants.

We quote the market quiet, with unchanged list:

AMERICAN REFINED BAR IRON.

1 to 6 wide by ⅜ to 1 thick.. } 1 to 4½ wide by 1½ to 2 thick }	2 5-10 to 2 6-10c. ₩ lb.
Round and square, ordinary sizes, from ⅜ to 2 inclusive	2 5-10 to 2 6-10c. "
Hoop Iron, 1½ wide and upward	3¾ to 4c. "
Band Iron, from 1¼ to 4 in. wide	3 to 3¼c. "
Horse Shoe Iron ¾ to 1 wide by ⅜ to ½ thick	3½ to 4c. "
Norway Nail Rods	7 to 7¼c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	15½ to 16c. "
Machinery Steel	11 to 11½c. "
Cast Spring Steel	10 to 10½c. "
Homogeneous Steel Plate	10½c. "
Perkins' Horse Shoes, per keg of 100 lbs	$5 12½
" Mule Shoes " "	6 12½

Common Horse Nails, from 14c. to 18c. per pound.

	10	9	8	7	6	
Putnam Horse Nails	23	24	25	26	28c.	per lb.
	10	9	8	7	6	
Globe Horse Nails	23	24	25	26	28c.	per lb.

R. R. Spikes.....5¼ by 9-16 at 2 9-10c to 3c. per lb.

Messrs. R. C. HOFFMAN & Co., Iron and commission merchants, Nos. 23 and 25 South Frederick street, report the Pig Iron market as follows, under date of Dec. 27: Transactions in Pig Iron have been very light during the past week, and we look for no change until after the holidays are over. We continue last quotations as fol'ows:

Baltimore Charcoal	$32·00 @ 35·00
Virginia "	28·00 @ 34·00
Anthracite No. 1	24·00 @ 25·00
" No. 2	22·00 @ 24·00
" No. 3	20·00 @ 22·00
White and Mottled	18·00 @ 19·00

CLEVELAND.

Messrs. C. E. BINGHAM & Co., 25 West Main street, under date of Dec. 27, quote the Iron market as follows, 4 mos. time:

FOUNDRY IRON.

No. 1 Lake Superior Charcoal	$39·50—4 m.
No. 2 " "	38·00—4 m.
No. 1 Anthracite	26·50—4 m.
No. 2 "	25·00—4 m.
No. 1 Bituminous	26·50—4 m.
No. 2 "	25·00—4 m.
No. 1, Cherry Valley Am. Scotch	29·50—4 m.
B—1 " "	27·50—4 m.
No. 2, " "	26·00—4 m.
No. 1 Massillon	28·00—4 m.
B—1	26·00—4 m.
No. 2	23·00—4 m.

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	$27·50—4 m.
No. 4 " "	29·00—4 m.
Nos. 5 & 6 " "	29·00—4 m.

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	$38·50—4 m.

FORGE IRON.

No. 1 Gray	$23·00—4 m.
White and Mottled	22·00—4 m.

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, Richmond, Va., writes as follows under date of Dec. 27: The Iron market is dull. No sales or receipts worthy of mention. Quote as previously. Nearly all the Charcoal furnaces in this State and North Carolina are out of blast. Stocks mostly sold. Out of twelve Charcoal furnaces in blast in 1874 in Southwestern Virginia, but three are in blast now, and one of these expects to blow out. Three of the five charcoal furnaces on the Chesapeake & Ohio Railroad have blown out, and one has been changed to a Coke furnace. The canal section has but one Charcoal furnace in blast. You can judge by this that a limited supply must come from Virginia till prices advance.

Virginia cold blast Charcoal Pig Irons	$27·00 @ 33·00
" hot " "	24·00 @ 28·00
Va. hot blast Coke Pig Iron, No. 1 ex.	24·00 @ 25·00
" " " " No. 2 ex.	22·00 @ 23·00
" " " " No. 3 ex.	21·00 @ 22·00
Virginia Anthracite. No. 1 ex.	25·00 @ 26·00
" " No. 2 ex.	23·00 @ 24·00

FOREIGN.

FRANCE.

(Moniteur des Interets Materiels).

PARIS, Dec. 12, 1875.—*Metals.*—Business in the European Metal markets will remain quiescent for a month to come. It is very much to be hoped that by the time the spring trade opens our manufacturers of metals may be able to reduce the cost of their goods materially, either by reason of cheaper raw material and fuel, or by means of some reduction in the scale of wages, or by virtue of cheapened methods of production. In the United States, where the ingenuity of invention has been bent particularly on the replacing of labor by perfected machinery, the cheapening process has been much facilitated, and manufacturing there adapts itself with greater ease to a lengthened period of stagnation. We are therefore witnessing in that country a gradual revival in many branches much sooner than in Europe, although the latter is backed by a much greater number and variety of customers. The perfected methods of dispensing with labor in America we shall have a good opportunity to study at the approaching Centennial exhibition, particularly as regards the larger tools for working metals, wood and all sorts of raw produce. The financial situation in Europe at the present moment has all the outward signs of ease because of the dullness in trade, notwithstanding the extraordinary depreciation which certain securities of semi-bankrupt nations have undergone. In France the losses sustained on Spanish, Turkish and Peruvian bonds alone are estimated at a milliard and a half of francs, the decline on these securities amounting to some 40 per cent. during the past three or four months. These losses are spread over a large population of small investors, especially in this city, and consequently do not lead so much to financial collapses on a vast scale in high quarters; still the money is irretrievably lost, and the purchasing capacity of the people at large is that much lessened. The share which falls to the lot of the metal trade and metal consumers may be comparatively small; yet losses of the kind have to be overcome by greater economy and harder labor, and time is required to obliterate them. *Copper* has remained quiet; the position of the metal is deemed a sound one, and holders consider it a good property, unmindful of temporary slight fluctuations. Little has transpired in it here. We quote on a firm market Chili Bars, deliverable at Havre, 215 francs; Common ditto, 210; Ingots, 220; English Tough Cake, 220; and pure Corocoro Ore, 212·50. Marseilles is steady at 215 for small Ingots. *Tin.*—It is impossible to judge of the probable future course of this metal, as long as we are kept in the dark as to the real position of the British in the peninsula of Malacca at the present moment, which may be a great deal more precarious than the laconical telegrams thence would lead us to suppose. As is frequently the case with similar uprisings, the rebels may sustain losses at first and seem weak, but a sort of desultory warfare may ensue, requiring constant reinforcements of troops from India on the part of the British, and eventually jeopardizing the vast Tin mining interests. Less animation has been observable in our markets, and we close weak at the following quotations: Banca, at Havre or Paris, 232·50; Straits, 220; and English, at Havre or Rouen, 222·50. Marseilles is steady at 220 for Straits and Billiton. *Lead* is quiet, but firm at 56 to 56·50 here; Spanish, at Havre, 56, and at Marseilles, 51·50 to 52 francs. *Spelter* is firmer than ever; here and at Havre Silesian, 66; other good brands, 65·50. Resmelted, at Marseilles, 55·50; Vielle Montagne Sheet, 85; other brands, 80 francs. *Iron.*—The demise of the president of the Creusot works is a great loss to metallurgical industry in France. These works were founded in 1836; at Mr. Schneider's death the same employed 15,000 operatives, 15 blast furnaces and 150 puddling furnaces, turning out 90,000 tons Iron and 18,000 tons Steel annually. The general Iron situation continues to be a pretty bad one; the business doing is from hand to mouth, at prices leaving little if any margin. *Coal.*—Little change can be reported in the Coal trade; the turn which prices may take is doubtful, notwithstanding the colder weather. In the Pas de Calais there seems to be more doing without any improvement in prices. In the Loire district a slight decline is noticed. The general tendency in Europe seems toward a further break in Coal prices; superhuman efforts are made to prevent a decline, but it is a most precarious undertaking. Here at Paris we are paying 60 francs; perhaps we shall not vary from this figure during the winter.

BELGIUM.

(Revue Universelle).

BRUSSELS, Dec. 12, 1875.—*Iron.*—There is nothing to indicate the nearness of some favorable change in the industrial crisis through which we are passing; the only consolation that may be adduced is the certainty that things cannot well get worse. Great irregularity in values is the main characteristic in most branches of manufacture. Thus at a late opening of tenders to the government the furnishing of six locomotive boilers was competed for by no less than seven establishments, the lowest price named being 87 francs, and the highest 109. Old rails have been taken for Scrap Iron at 90·50 to 102·77, the 1000 kilos. On the 22d instant tenders will be received for the furnishing of new rails in 1876 for the State railroads. At the northern station of the Great Central Belgian Railroad the new contrivance of Mr. Macquet for protecting conductors and brakemen was examined by the directors. This is certainly a desirable innovation as regards the present passenger cars used on the Great Central Road, but we trust the day may be near at hand when cars constructed after the American fashion will be adopted by this line, doing away with similar contrivances. American passenger cars have been introduced by degrees, to the general satisfaction of the traveling public on the Swiss, Russian and Luxembourg railroad lines, as well as by a few lines in Germany, France and our own country. The present system of most of the European lines which exposes officials on the train to all the changes of the weather is a barbarous one, and the sooner it is done away with the better. *Coal.*—The severer winter weather has stimulated the demand for household purposes. This cannot be said of Coal for Iron industry, which meets with comparatively little demand; for Coal of this description no improvement seems to be in prospect. Should the cold weather continue a couple of days all our canals will be closed. Traffic may then be seriously hampered, the more so as beet root claims imperatively a number of freight cars. To date from the 1st instant the Coal miners of the central district have had their wages reduced 15 per cent.

GERMANY.

(Borsenhalle).

HAMBURG, Dec. 11, 1875.—*Metals.*—As we had occasion to remark in our last report, business prospects for the ensuing year are reassuring. There can be little doubt as to the firm resolution of the Northern powers to maintain the peace of Europe, whatever may happen. In spring this year grave doubts were entertained by the best informed on this subject, until it was known that an imminent danger had been averted by the firm attitude of Russia. Now everything is changed; the peace programme has been formed and will be adhered to, and finances, trade and industry will be permitted to recover from the blows inflicted on them during the past two years. Much of a war demand for metals need not be expected; the insurrection in the Turkish provinces will be quelled, if need be, by an occupation of the intervening powers, and in Spain the civil war will in all likelihood come to an end. But in lieu of a war demand we trust consumption will be able to cope with any increased production of metals under a general revival in business. But till spring we shall have quiet times; all the houses left standing after the many failures are now endeavoring to recruit their forces for the advent of a better business year, and commerce will then rest on a surer foundation. A similar revival on the other side of the water would materially assist in overcoming the consequences of the industrial prostration from which the world has been suffering, inasmuch as it would quicken the exchange of products between both hemispheres. *Copper.*—This metal has offered no features of special interest, and we have remained steady here on the basis of 94 marks for Drontheim, and 110 for Minnesota. At Berlin the quotation of 90 to 93 is maintained for English and Australian, and 93 Mansfield. Stettin is firm at 95 to 100 marks. *Tin.*—So many uncertainties surround the immediate future of this metal just at present that consumers seem determined to operate only from hand to mouth, and all our markets are quiet, with prices barely sustained. We quote English here 95 and Banca 96 marks. Banca at Berlin is 96 to 96·50, and English 93 to 93·50. At Stettin Banca is quoted 98 marks. *Lead* remains unwaveringly firm. We quote English here, 25 to 25·50; German, 23·50 to 24, and Spanish, 26·10. English White Lead commands 33 marks; Dutch, 33·50. Stettin quotes Spanish 27; Tarnowitz, 25, and other brands German, 25. Berlin is steady at 25 to 26 for Tarnowitz, Hartz and Saxonian. *Spelter.*—A growing scarcity begins to be felt; the demand remains moderately active. We quote Silesian, spot and to arrive, 25·90; Zinc white, 33 to 37 marks. At Berlin good brands Silesian Spelter command 25 to 26 marks; at Stettin, 27. All the foregoing metal quotations are for 50 kilos.

HOLLAND.

(Koch & Vuerboom).

ROTTERDAM, Dec. 11, 1875.—*Metals.*—*Copper* is steady at 50 to 52 guilders for Drontheim and 51 for Russian Crown. *Tin* is dull. The asking figure, 50½, cannot be obtained. There are no buyers above 50. Billiton, spot, 49½. *Lead.*—The firm attitude of this metal has not been impaired. We quote Stolberg and Spanish 13, and German 12¾ to 13. *Spelter* is scarce and well sustained at 12½ to 12¾ guilders. All the foregoing quotations are for 50 kilos.

EAST INDIES.

Gilfillan, Wood & Co.

SINGAPORE, Nov. 3, 1875.—*Tin.*—Transactions during the fortnight have been small, and the market closes with sellers, but no buyers, at $23·25 per picul. The engagements for the United States now amount to over 350 tons. *Tonnage.*—The supply of disengaged vessels is in excess of the demand. For the United States there have been no charters, and the only vessel loading is the G. F. Muntz, for New York. The steamers Glenlyon and Fleurs Castle have increased their engagements of Tin to over 300 tons, and the latter has engaged a small quantity of measurement cargo. There have been shipped to the United States during the first ten months of the year 47,675 piculs, against 31,396, 32,425, 47,560, 47,062 and 48,581. *Exchange* has declined to 4/2 for first-class six months' credit drafts on London.

(Dummler & Co.)

BATAVIA, Nov. 6, 1875.—*Tin.*—The next sale of 10,000 piculs Billiton will take place 13th proximo. *Coal* is almost unsaleable, and quotations are thus quite nominal; Australian sold at 15 guilders. *Exchange.*—On London there was a good inquiry for bank bills at 11·75 guilders the first half of the month, but the demand has since fallen off, and the banks have reduced their rate to 11·72½. Credits were placed at 11·67½ to 11·72½, and documentary paper found buyers at 11·65 to 11·67½.

AUSTRALIA.

(Colonial News.)

LAUNCESTON, (Van Diemen's Land), Oct. 21, 1875.—*Tin.*—The Stanhope Co. expects great things, as the show of wash dirt is so very promising. In the Menzies section some nuggets average not less than 70 per cent. We hear of masses of rock, 60 per cent., cropping several feet above surface. Already 35 mineral sections, of 80 acres each, have been taken up, on leases of 21 years, with liberty of extension 14 years more. The rental to government is 5/ per acre a year. The Van Diemen's Land Co. is now coming to the rescue of the Tin miners; the prospects are quite satisfactory. From one-half acre, out of an 80 acre section, 468 tons have already been obtained. While in Cornwall men are satisfied with 4 pounds to the ton, the result of a trial with 18 tons in this city proved a percentage of from 51 to 72 pounds. Nuggets of from 2 to 8 cwts. each are among the finds of the Stanhope region. The tailings were discovered to realize as much as ¾ pound to 1½ pounds to the dish. Two furnaces are being erected.

CHINA.

(Arnhold, Karberg & Co.)

CANTON, Nov. 10, 1875.—*Metals.*—*Tin* is freely offered at a concession of 25c. to 50c. per picul, but unfavorable advices from the North have caused buyers to hold back, and only a few settlements have taken place. Business in *Lead* has been insignificant; prices, however, continue to be well maintained. *Quicksilver.*—Some small sales have been effected during the early part of the past fortnight at $107 to $107·50; subsequently, however, prices receded to $104 to $103, and almost the entire available stock has been taken up at these figures by native consumers. Since then a large speculative business has been going on for forward delivery at prices ranging from $100 down to $93 per picul, but the demand is now subsiding, and the market closes quiet with a downward tendency. We quote Tin $21·50 to $24·25; Lead, $7·45 to $7·60, and Quicksilver, Spanish, $98 to $99; California, $99 to $100. *Exchange* on New York, 5 months' sight, 6 per cent. discount.

The Future of Ferro-Manganese.

We have received from M. Champin, New York agent of the "Societe anonymi des Fers et Aciers par Alliages de Manganese, of Paris," a communication of which the following is a translation:

Metallic manganese seems to play in the metallurgy of iron and steel a double part.

1. It reduces the oxide of iron by reason of its great affinity with oxygen. The application of spiegel and ferro-manganese and their power of reduction when applied to oxide of iron dissolved in a bath of steel, according to the Bessemer or Martin-Siemens process, may thus be explained: Steel in a state of fusion seems to absorb oxygen with greater ease the less carbon there is mixed up with it, for if there be carbon, carbonic oxide would be produced and the iron would not be oxidized. Since there was more and more demand for the softer kind of steel, an energetic agent of reduction was in all the greater demand. It was, therefore, a great step forward to be enabled to thus condense in a special alloy iron and manganese, the ferro-manganese, which proved to have the reductive power that was required. The small quantity which it is necessary to use enables us to reduce to almost nothing the carbon which is redissolved in the steel, and we are thus able to produce a steel of unexpected softness.

The use of ferro-manganese for the production of soft steel of prime quality seems to have a great future. The substitution of the cast metal of extra softness for iron in metallic constructions is in Europe almost a solved problem, and there is little doubt but that in America, where people are in the habit of courageously taking in hand ideas thus put forward, and bringing them to a successful issue, the Old World may even be outstripped in the matter.

When applied to metal less pure and containing sulphur and phosphorus, the ferro-manganese shows that the carbon and phosphorus both tend to harden the steel to such an extent that their joint presence may prevent the metal from being malleable and capable of being drawn when hot, while rendering it liable to fracture when cold. When removing almost all the carbon by applying the ferro-manganese, we have been able to study thoroughly the nature of soft metal containing phosphorus, and to discover that it possessed all the malleableness of phosphorus iron when worked in a heated state. On the other hand, the resistance to blows in the metal is sufficient for making good rails, provided the proportion of phosphorus is not carried too far, and care be taken that on rolling the metal the ingot to be drawn be sufficiently large for making the bars.

In this manner it will be possible to take in hand old iron rails, and transform them into new steel ones. There are few countries where this transformation would prove more useful and profitable than in the United States. The cost of remelting and transformation is by no means greater than in the Bessemer process, and the material used is cheaper. The latter will even become cheaper when the use of iron rails shall have been abandoned altogether, and they will then be forced on the market and go at a very low figure.

In producing a soft kind of steel little carbureted or altogether free therefrom, the great problem has been solved of transforming old material into new rails of a durability which experience has not yet been able to determine with accuracy, but varying between 50 and 100 years for ordinary traffic use.

It is at the same time evident that the less ferro-manganese is put into a bath the greater will be the chance of obtaining a soft and decarbureted metal. Hence the necessity of using a ferro-manganese in which the manganese largely preponderates.

The unit of manganese is not dearer in it than in poor ferro-manganese; later on it will become cheaper, when a larger consumption will have stimulated a more perfect production. And, on the other hand, the success of being able to be sure of the product to be obtained is more easily insured.

The attempt has been made to substitute for the ferro-manganese metallic manganese or cast manganese; it has even been attempted to produce spongy manganese, but these experiments have ended in failure.

The oxide of manganese can only be reduced with difficulty. It easily takes the state of protoxide of manganese in presence of carbon or carbonic oxide without requiring a high degree of heat. But when it is attempted to remove the remaining oxygen and produce a metallic manganese, the affinity of the carbon is not sufficient; either we must use a degree of heat, which we have not yet been able to attain on a large scale, or we shall have to avail ourselves of the affinity of manganese for some other material—iron, for instance. Hence, the necessity of alloying iron with the manganese, and thus obtaining a molten product, the reduction taking place at a temperature at which the gangue of the ore is forcibly liquified.

It is useless to try to substitute in the place of ferro-manganese a manganese imperfectly reduced, because the existing admixture of silicates in the ore would, beside, have the drawback of adding to the bath of steel to be reduced a substance which absorbs with avidity oxide of iron, and the amount of slag would be increased thereby. Aside from this, it would be an expensive material, uncertain in its application, the portions where the reduction has been brought about to its full extent being but few when compared with those where the protoxide of manganese is combined with the earthy elements of the gangue.

It would be desirable, therefore, for the manufacturers of ferro-manganese to endeavor to utilize to the fullest extent the manganese contained in their ores, thus enabling them to furnish us, at a moderate cost, the most concentrated alloys. From 60 to 65 per cent. of manganese seems at the present moment a practical limit to its richness, which can probably not be well exceeded without rendering manufacture more difficult—at least, as we are situated at present.

2. Another quality of manganese, which recommends all the more urgently rich alloys, is the alloy which is formed between the manganese and the iron in steel, whenever an excess of the reducing alloy is applied, in which case the excess adheres to the metal, and imbues it with qualities of the greatest importance and hitherto but little known. In order to call forth to their fullest extent these qualities it will be requisite to leave 0·8 to 1 per cent. of manganese in the metal, which cannot be done without using the very richest ferro-manganese; for in default thereof we should be simply carried back to spiegel; carbon would be re-incorporated with the steel, and we should be prevented from obtaining a soft metal on the one hand, and a phosphorus one on the other.

Whenever steel be manganesed through an excess of rich ferro-manganese the resistance to blows is increased in a striking manner. We may either allow more phosphorus to remain, or we may impart to cheap material a greater value in point of safety and durability. The conversion of old iron rails into new ones of cast metal will then cause the apprehensions to disappear, which had been entertained as regards the future of the new metal in comparison with steel rails of first quality, *i. e.*, produced from pure material.

Another quality of these new steels is that the hardening in water, which was inapplicable to soft steel entirely decarbureted (whether containing phosphorus or not) is easily attained once more, as though the metal were carbureted and pure. Practically, this is less important than the increase of resistance to blows, but from a theoretical point of view it is a curious fact. If the carbon and the phosphorus replace each other for the hardening of steel, the carbon and the manganese seem to replace each other in producing a metal capable for hardening in water.

For a long time past it has been an acknowledged fact that manganese co-operated usefully in puddling the better kinds of iron or puddled steel. The manganese causes the slag to be less adhesive, it retards the disappearance of carbon, and admits on the one hand a greater attainment of purity, and on the other the retention of part of the carbon whenever iron approachin: steel is to be produced. The only difficulty arising is that there may be too much manganese in the metallic bath, for in such an event the refining process would become a tardy and difficult one. The ferro-manganese similar to a titrated solution allows the precise quantity to be apportioned which may be required of manganese, and has thus far given the most satisfactory results.

Until now the ferro-manganese, which contains upward of 25 per cent. manganese, has been imported from Europe, and the question arises whether we shall be always dependent on the Old World for a product which seems to be destined to play a part of such importance. The use of a similar substance adds but little to the cost of importation of a ton of steel, and labor being dear in the United States, it seems doubtful whether we shall soon be able to produce the same at less cost than European manufacturers can do who are familiar with this new species of metallurgy. It should not be overlooked that its manufacture claims great care, that but few have been able to do so to advantage at the present market price. But while we are as yet unable to produce it ourselves, it seems but advisable that we should learn how to use it, and thus to avail ourselves of its existence as advantageously as we can.

Note on the Steam Carriage of M. Bellee, of Mans.

BY M. TRESCA.

[Translated from *Comptes Rendus* By J. T. Thurston.]

The passage through many parts of the city of Paris of a new steam carriage having lately attracted public attention, we have thought that the Academy should be made fully acquainted with this machine, which has been, in some respects, very carefully constructed and adapted to a special purpose.

M. Amedee Bollee, a manufacturer of Mans, designed it for a family carriage; with it he can go where he pleases, transport his materials to the railroad station, or he can use it as a pleasure or traveling carriage.

He came to Paris with it in eighteen hours, and, after making in the city a few runs of from 15 to 20 kilometers*, he returned to Mans, by way of Vendome, where one of my sons traveled with him long enough to complete the information that I obtained at Paris on two of its trips.

The carriage, with water and coal, weighs 4000 kilogrammes, and 4800 kilogrammes† with 12 passengers. The weight is distributed thus: 3500 kilogrammes on the two driving wheels of 1m. 18 diameter, and of 0m. 12 width of face, and 1300 kilogrammes on the two wheels of the forward truck of 0m. 95 diameter. Each wheel is placed between two pairs of springs, placed as near the center as possible, for the purpose of diminishing the bearing on the axle, thus reducing it to the smallest dimensions. The two driving wheels are loose on the rear axle; the two forward wheels are more independent of each other, and the steering apparatus is so arranged that these two wheels, when it is necessary to make a short turn, take each a direction perpendicular to the radius of the curve through which the conductor wishes to turn the vehicle. This independence of the four wheels, and especially this property of the leading trucks, insure to the vehicle a precision and facility of working which has never before been attained. At the rear is a vertical boiler of the Field system, of an exterior diameter of 0m. 80, one meter in hight, containing 194 tubes for the circulation of water, of 27 millimeters in diameter. It supplies steam to four cylinders, arranged in pairs between the wheels, at an angle of 45°, each of these pairs working a shaft, which turns by gearing and an endless chain the corresponding driving wheel.

The pistons of 0m. 10 diameter and 0m. 16 length of stroke, together sweep through a volume of 5 litres* per turn of the intermediate shaft, a volume which, compared with the actual expenditure of feed water, shows that the waste by leakage or by *entrainement* is considerable.

All the parts of the carriage, of the engine and of the boiler, are made of steel, lightness being secured by carefully calculating dimensions with a reference to the force exerted upon them.

In the front of the vehicle are situated all the apparatus of control, at the disposal of the conductor, who sits in the midst of the space, facing the route to be followed, ready to execute all the evolutions that circumstances may render necessary.

After having cleared the cylinders by means of water cocks worked by hand, and having opened the general communication of the valves with the boiler, he regulates by pedals the quantity of steam supplied to each group of cylinders, thus accelerating as required or retarding the speed of engine, or even stopping the driving wheels. He can also move backward by using a Stephenson link and valve gear, which also permits him either in going forward or backward to regulate the supply of steam. The steering wheel, which works the wheels of the steam carriage, is constantly under the action of his right hand, which never quits it, while the left hand, behind the seat, can at the same time, according to the condition of the road, change the speed from rapid to slow, or the reverse, without regard to the usual speeds of the engines themselves, which make in regular traveling 180 revolutions per minute. The steam gauge, which indicates pressure of the steam, is also placed under the eyes of the conductor; nothing is wanting but a steam whistle to give the necessary warning to drivers of vehicles on the road over which it is passing, or which it is crossing.

The boiler is managed by a man standing behind, who tends to the fire, and feeds by means of a Gifford injector or a pump, drawing water either from the tender while in motion, or from streams during the stops which must be made every 10 kilometres, in order to replenish this tank, in which case a special pump of greater capacity is used.

The carriage makes easily 20 kilometers per hour on level ground, and 12 to 15 kilometers on much traveled roads; it maintains a speed of 9 kilometers on grades of 5 centimeters per meter, and can easily draw a carriage as heavy as itself.

It certainly cannot be maneuvered as easily as one of our coaches, but more easily than an omnibus, as it dispenses with seats and horses. It stops, starts, turns out and avoids other vehicles with a surprising precision, which is certainly due to the very novel arrangement of the two independent wheels, which take the place of the ordinary form of leading axle.

The solution of this important part of the problem, lends a special interest to the operation of this machine.

In running on level ground 15 kilometers an hour, it develops, taking 0·05 as coefficient of traction, an effective impelling force equal to 13 horse-power for its full load. It uses, in going this distance, 600 liters of water, which, at the rate of 30 kilogrammes per horse-power per hour, would correspond to 20 horse-power. It is evident from this that a part of the water is lost or not used, the Field tubes causing also quite a considerable priming. The consumption of coal per hour would not, under these conditions, be less than 50 kilogrammes, which represents an expenditure of 1·50 francs only for fuel.

When we thus analyze the different elements of the problem of steam locomotion, we are tempted to admit that it is approaching a really practical solution; it is the more interesting as the use of street railroads will perhaps make the employment of mechanical motors indispensable even under present conditions.

In the trip that we made from Quai Jemmapes to the Fontainebleau gate by the Place du Trone, we noticed that horses rarely seemed disturbed by our passing. In several of the carriages that we passed the passengers were not even interrupted in their reading by the noise of the locomotive.

I should add, however, that on this trip a leakage occurred from one of the boiler tubes, which it was necessary to plug on the spot; the machine remained for more than an hour at rest, that the boiler might be cooled, and the tube corked.

We herewith present the statement of times and distances traveled:

	Minutes.	Distances in kilometers.	Corresponding space traveled per hour.
Quai Jemmapes	12	2·10	10·5
Boulevard Voltaire	10	2·10	12·5
Boulevard Mazas	10	2·10	12·5
Boulevard de l'Hopital	6	1·25	12·5

On the Austerlitz bridge, which was crowded with carriages at the time of our passage, the locomotive took its place among the other vehicles and kept up with the same speed, the file that preceded it.

We should not close without describing the mechanism of the leading truck, which allowed of the attainment of these results, and which is very simple.

The vertical shaft of the steering wheel is provided at its lower extremity with two elliptical cams whose larger axles coincide with each other, and when the road is straight lie in the same direction as the two small axles of the leading truck.

A chain fastened to the two ellipses encircles a chain wheel of a diameter equal to the smaller axes of these ellipses, and which turns with the king bolt of one wheel, say the right, for example. On turning the steering wheel—this wheel turns vertically about its point of contact with the earth, according to the length of the arc of the ellipse developed; that is to say, of a larger angle if it is turned to the right, a smaller if turned to the left.

This arrangement being double and applied in the same way to the left wheel, one can easily see how, pivoting on themselves and without sliding, the leading wheels necessarily place themselves at a proper inclination, and continue tangent to the two arcs which they describe about the centre of rotation.

Undoubtedly this combination will mark a real, if not a decisive, progress in the history of steam to locomotion. Nor is it unreasonable to predict that, by means of special devices, the conductor's operations may readily become similar to those of the driver as he urges, checks and guides his horses.

N. A. Ridgway & Co., of Youngstown, Ohio, who have been in pecuniary difficulties, have obtained an extension from their creditors.

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* The kilometer = 0·621 miles.
† The kilogramme = 2·2 pounds.

* The litre = 0·264 U. S. gallons.

Annual Review of the Metal Markets for 1875.

COPPER.

There has been but a moderate demand for manufactures of Copper and Brass throughout the year, and Copper would not have been as well sustained as it has been but for the arrangement for a better control effected between the leading producers on the one hand, and one of the financially strong dealers on the other. In Europe the more general adoption of phosphor bronze for the casting of artillery has absorbed large quantities of Copper, and materially assisted in upholding prices there. The year commenced with a stock of 10,000,000 pounds, Lake Superior Copper commanding 23¼c. @ 23½c.; in Europe Best Selected opened at £95, and Chili Bars at £84. Sales at New York in January footed up 1,600,000 pounds, considerable weakness developing as the month advanced, one of the speculative holders getting tired, and quite a break occurring during the third week, with a decline to 21½c. Baltimore remained quiet at nominally 22c.; it has followed closely the quotation for Lake to the end of the year. Cable communication between London and Valparaiso was restored *via* Montevideo early in January, and upon the announcement of liberal charters Chili Bars declined from £84 to £82. Reported Copper shipments from Japan to Europe precipitated this downward movement. Statistics reached us from London, according to which the world's apparent Copper consumption was set down as follows: 1874, 89,691 tons; 1873, 78,079; 1872, 69,291, and 1871, 83,781, while the extreme range of prices for Chili Bars at London was in 1874, £89 and £73; 1873, £92 and £79; 1872, £108 and £77, and 1871, £85 and £64. Sales in February were restricted to 450,000 pounds Lake, the market opening at 21⅞c. @ 22c., and gradually declining to 21⅝c. @ 21⅞c. In consequence of the extreme severity of winter, our railroads were overcrowded with freight, and Sound navigation remained closed. At the same time it was not expected that Lake navigation would open before June 1, and the supply till then was estimated not to exceed 11,000,000 pounds; there would thus be no Copper left for export during this interval. Although insurmountable obstacles stood in the way of transportation inland, and collections were slow, consumption at the centers of distribution had been steady. London meanwhile recovered to £84, but finally receded to £83 for Bars, while Best Selected rose from £90. 10/, to which it had declined since January 1, to £91. The inclemency of the weather extending into March, sales were limited to 600,000 pounds Lake, prices ranging between 21½c. @ 22c., closing at 21½c. At London the month opened with some steadiness at £82. 10/ and £90, there being a good demand for India, which was partially filled even from Australia, but during the third week the failure of Im Thurn & Co. occurred, causing Bars to decline to £80 and Best Selected to £87. This failure was immediately followed by others at London, all in the South American trade. The month of April was ushered in under more favorable auspices, the weather having become more genial, and a general revival manifested itself, leading to sales during the month of some 1,100,000 pounds for domestic consumption, and 250 tons for Hamburg, the latter at 21¼c. @ 21½c. The stock here had been gradually reduced, and supplies by rail from the Lake region were impeded by the breaking up of the roads there, on which sleigh transportation was thus stopped. The market rose from 21½ to 23⅛, closing at 22½c. It transpired that some 5,000,000 pounds would be shipped to Europe up to October. The Lake companies had now closed out their balance of last year's stock. London recovered from £80 and £87. 10/ to £81. 10/ and £88. In May the purchases for export, alluded to before, were carried out in the shape of futures, June to September inclusive, at about 21c., while on the spot 2,200,000 pounds changed hands at 22c. to 23¼c., closing at the outside figure. The spring demand from manufacturers thus far proved a disappointment, but holders had the metal now well under control, new Copper not being due till the middle of June. Chili Bars at London recovered to £83—£83. 10/, and B. S. to £90. In June the failures at London had in the aggregate assumed colossal proportions, summing up some £40,000,000 liabilities, and Copper would have gone low there, but the government demand for armament counteracted the bad effect, Chili Bars not declining below £82 to £82. 10/, and the visible supply in Europe being 18 per cent. below the average. Sales at New York, 1,300,000 pounds Lake, at between 22⅝c. and 23c., closing at 23c., spot, and 23½c. futures. The failures in England had no effect here. Lots of new Copper arriving passed into the hands of previous purchasers. The holidays and midsummer now being at hand, July opened with the usual stagnation. Outside lots offering were, however, not large enough to depress the market. The demand from manufacturers remained light till the third week, when great briskness began to prevail, sales summing up for the month 1,400,000 pounds Lake, at between 22⅝c. and 23¼c., but the failure of Duncan, Sherman & Co. spread a momentary gloom, the market closing at 23c. The continual failures at London caused a decline from £82. 10/ and £90 to £80 and £89, charters at the same time being large. Accounts came to hand from Chili according to which that country exported in 1874: 48,253 tons, against 42,177 in 1873; excess 6076 tons. In August the accounts from Europe expressed apprehensions of short crop, while here the harvest promised abundance, and an era of prosperity for a moment seemed to dawn upon us; but the illusion was promptly dispelled, the weather in Europe improving and rescuing the grain, while continual rains and floods did much harm here. While buoyed up by sanguine expectations all the markets here had improved, and Copper participated in the activity displayed. Sales during the month between spot and futures aggregated 4,850,000 pounds, at between 23c. and 23¾c., manufacturers also beginning to buy more resolutely. London from £81 and £88, recovered to £83 and £89. September opened under the unfavorable effect of the Baltimore and San Francisco failures, but these exercised no influence on the Copper market, which displayed a moderate amount of activity. Reports from our manufacturing regions were rather unfavorable, yet the sales summed up 1,450,000 pounds at 23⅛c. @ 23½c., closing at 23¼c. Bars in England receded to £81. Statistics came to hand from London, according to which Devon and Cornwall during the last fiscal year produced but 51,226 tons ore, against 209,305 in 1856. In October a somewhat better feeling began to prevail, but was speedily checked by the lack of activity in the manufacturing regions. Sales nevertheless aggregated 1,950,000 pounds spot, and 600,000 pounds futures November to January, at 23c. @ 23½c., closing at 23¼c. London had steadied, remaining £83 and £90. November.—In order to prevent the market from giving way, the parties principally interested in the metal came to the rescue during the month, and 1,950,000 pounds changed hands, 1,100,000 of which December—April futures, the range being 23c. @ 23½c., closing at the outside figure. Although the feeling had become a steadier one, it remained manifest that the market lacked activity at the hands of consumers. Europe remained unexcited at £82. 10/ and £89; statistics proved that Europe had absorbed Chili Copper to satisfaction. Sales in December footed up 1,150,000 pounds Lake, on the spot, prices declining from 23⅝c. @ 23½c. to 23¼c., the month winding up dull, but with a good deal of firmness. London closed at £81. 10/ for Bars and £88 Best Selected.

TIN.

The course of Tin prices had been a steadily downward one till the first week in August, since when a gradual improvement took place, which has been tolerably well upheld. In August two important facts became apparent, the one that Australia would in any event not export more Tin than in 1874, and the other that at the low prices prevailing the consumption of Tin had materially increased in both hemispheres. Confidence in the metal thus revived, despite the by no means favorable statistical position. In reviewing the fluctuations, we shall quote Straits Tin only, in gold. The year opened at 22c., against 28c. the previous one. London at £94; Singapore at £24·75. The average price of Straits Tin at New York during the preceding seven years had been: In '74, 23⅛c.; '73, 30⅛c.; '72, 37c.; '71, 36c.; '70, 33½c.; '69, 31¼c. and '68, 24½c. Throughout the month of January a fair jobbing trade prevailed, and the price kept steady at 22½c. The London market at first displayed some strength in consequence of the large purchases of Tin Plates for American account in December, but when it became known that large shipments of Tin were in course of preparation from the East, a heavy decline was foreshadowed, precipitated by a drop of, 2¼ guilders at the Dutch sale, and February opened at £92. Although the Olive for Boston was lost, with 4500 slabs Tin, we declined 1c., and closed at 21½c. London fell to £88, and Singapore to $24. March, amidst the extreme ease in money matters, developed a speculative demand in Europe during the first week, and a recovery took place to £90; but the improvement could not be sustained, and £85 ensued, followed by a gradual rise to £89. Singapore remained at $23·50. These violent fluctuations in Europe, reported per cable, gave rise to a feeling of caution and suspicion here, and we gave way to 20¾c. @ 21c., notwithstanding a further improvement to £90 at London, and $23·75 at Singapore. In April it soon became evident that the market had been correctly judged among us, for London receded to £85. Tin experienced a further weakening process here, and at Boston 7000 slabs sold at 19¼c. @ 19½c. to close out an estate, and after declining to 20c., we wound up the month at 20¼c. @ 20½c. Although a drought in Malacca impeded production somewhat in that locality, the European speculation for a rise had proved a failure. In May a deeply-seated demoralization settled on our market, despite a sudden temporary rebound at London, which had previously gone down to £82, and then rose to £85. Singapore from $22·50 declined to $22. Our own market from 20c. dropped to 18⅝c. Accounts reached us from the Billiton Mines that the production in 1874 had attained 62,808 piculs, against 50,980 in 1873, and that the stock at Banca, January 1, had been 77,195 piculs, against 63,245 in 1873. The output in the Dutch East Indies was thus shown to have been ample. June opened under the unfavorable impression produced by a low ruling at the Dutch sale of but 50 guilders for Banca, and a decline of £2 at London in consequence. Of Straits Tin the stock here was now larger than could be conveniently carried, some of it offering at 18½c, but closing firm at 18⅝c., more confidence spreading in Europe when the large deliveries there became known. London closed at £84, and Straits, at Singapore, from $22 rose to $22·25. Early in July it was shown that New York and Boston had distributed to consumption the large amount of 2574 tons since January, and although our market in view of a reduced visible supply displayed increased activity, prices remained between 18 and 18¼c., closing at the outside figure. In Europe unfavorable elements again rose to the surface, Tin plate manufacturers suspended operations, and failures in the East India trade were announced at London, carrying Tin from £83 to £77. 10/, and Singapore to $21. In August the Tin markets opened lower than ever, the Dutch sale having come off at the reduced figure of 48¾ guilders for Banca, and London touched £77, the greatest depression witnessed for years. Large deliveries on the other side here came to the rescue, Singapore promptly responded, rising to $21·75 and $22, and as the discount at London had fallen to 2 per cent., capitalists took courage and an upward movement of a more lasting nature was inaugurated. At the lowest point a sale of 1000 slabs was forced off here at 17¾c. London now rapidly recovered to £80, and we wound up at 19c., with a fair jobbing trade. Early in September some interesting particulars came to hand from Singapore, showing that Tin cannot be produced in the Straits below $20. Simultaneously the cable reported a drought and diminished output in Australia, contradicting previous news of an ample prospective supply thence. Singapore remained steady at $22·50 @ $22·75; London, from £82. 10/, gave way to £81. 10/, and then rapidly rose to £85, when it was shown that there was no abatement in the heavy deliveries. The metal trade of Europe and America now began to form a decidedly favorable opinion of Tin at current values, and the month wound up firmly in our midst at 19 @ 19¼c. In October it was furthermore ascertained that the output in Cornwall had suffered quite a reduction, and that leading smelters had bought extensively of foreign Tin. Yet the statistical position lacked strength. The month opened with a fair amount of activity here, 3000 slabs selling the first week, spot and afloat; prices ranged from 19⅛ @ 19⅝c., closing listlessly at the latter figure. The Dutch sale going at 53 guilders, London rose to £88. 10/, in order to recede to £85, at which it closed. November developed a good jobbing trade here, and from 19⅝c., prices rose to 20c. It was shown that of English Tin during the first ten months there had been shipped this way but 585 tons against 2540 in 1874. At the same time news reached us of political disturbances in one of the Straits settlements, imparting a passing speculative buoyancy to the London market. London from £85 improved to £85. 10/, and Singapore from $22·75 to $24. It was soon discovered, however, that the Perak rebellion would be promptly and vigorously quelled, and London, after dropping to £83, reacted to £84, at which it closed. Deliveries in Europe, which had been all along unusually heavy, now decreased, while the stock at London increased, and together with it shipments from Australia. We nevertheless remained steady here, and closed at 19¾ @ 20c. December was inaugurated by heavy arrivals here from the Straits, and in Europe by quite a decline at the Dutch sale, at which Tin dropped 2½, going at 50⅛ guilders. As the month of December proceeded, weakness and dullness settled upon both the European and American markets, while Singapore gradually improved to $23·37½ @ $23·50. London dropped to £81. 10/, Straits, at the close, while prices here settled down to the following closing quotations: Straits, 19¼c. @ 19½c.; English Refined, 19¼c.; do. Common, 19c., and Banca, 23½c. @ 24c., all gold. The stock of Tin at New York and Boston, July 1, was, according to Messrs. White & Haskell, of this city, 361 tons, since when there were imported 1375 tons Straits, 28 English Refined, 170 L. & F., and 15 Banca, together 1588, making the supply 1949, and deducting therefrom the stock to-day, of 385 tons, it will be seen that there were distributed to consumption 1564 tons, against 2574 the first six months of the year; the year's consumption was, therefore, 4138 tons, against 4629 and 4313 the previous two years.

TIN PLATES.

Since the industrial crisis on the Continent of Europe, the consumption of Tin Plates there seems to have greatly diminished, and notwithstanding the strikes in Wales, production has been in excess. The consequence has been a steady decline, involving severe losses during the entire year. Consumption in our own country has experienced no check to speak of, yet the drop in prices has been of late even greater than in Europe, but the decline below the cost of importation has brought about a favorable reaction, and prices at length seem to have touched bottom. Our quotations are gold, per box, ordinary brands. The year opened at the following rates: Charcoal Bright, $9·75 @ $10; ditto Ternes, $8·62½ @ $9; Coke Tin, $7·75 @ $8, and ditto Ternes, $7 @ $7·25. The market in January exhibited much strength; reports reached us of the strikes in Wales, and a fair amount of activity developed in consequence. In February the strike on the other side had become more general, and makers became diffident as to the possibility of future deliveries. The severity of the season proved a serious hindrance to trade on this coast, and the market relapsed into dullness. March not coming up to expectations, prices declined from 25c. to 50c. per box; toward the close some 6000 boxes Coke Tin sold from first hands. In April it became evident that the spring business was a partial failure; trade in Plates remained of a moderate jobbing character merely, leading to a decline of 25c. In May our own declining market reacted on that of England, which receded in proportion, while here a drop of 62½c. to 75c. was brought about by persistent inactivity. In June prices had gone down in England to a figure equal to the average of the seven years preceding 1871, when the advance in the article had been started, and the works over there began to curtail time. Meanwhile stocks at the West had been much reduced, and a good many inquiries reached us from there, but resulting in offers too low to be submitted to by holders. One sale of 1000 boxes Coke Tin was made at the reduced figure of $6·87½. Notwithstanding the light stocks out there, the West managed to stave off buying, and in July prices gave way 87½c. @ $1 per box. The mid-summer stagnation brought down prices still lower in August by 12½c. @ 25c. per box. In September production was further checked in England, and a stronger feeling arose from it on the other side without staying the downward tendency here. Some 7000 boxes Coke Tin were taken during the third week for people in the West, partly California. A little more animation sprang up at the reduced figures, which, at the close of the month, were for Charcoal Bright, $7·37½ @ $7·62½; ditto Ternes, $7; Coke Tin, $6·50, and ditto Ternes, $6·25. October opened with a more hopeful feeling upon announcement of large transactions in England, but the effect did not show itself in our midst, although we were now 50c. below the cost of importation. Dealers reported that the aggregate sales effected by them since January 1 footed up in value larger than during the corresponding period in 1874, notwithstanding the great difference in the prices obtained. Prices at length seemed to have touched bottom, and confidence gradually returned, the more so as stocks in consumers' hands were known to be unusually light. The abundance of the fruit crop and the low price of petroleum had led to increased consumption of Tin Plates in those branches of trade. Yet, even November passed off without leading to the expected revival, and a partial decline of another 12½c. occurred, while with the decrease of production in England much strength was reported from the other side. Although the English market gained in strength almost daily, we remained very quiet here in December, but firm. The following were the closing quotations in gold per box, large lots, ordinary brands: Charcoal Bright, $7·50 @ $7·75; ditto Ternes, $7; Coke Tin, $6 62½ @ $6·75, and ditto Ternes, $6·25 @ $6·50.

SPELTER.

In Europe the consumption of this metal has increased very much; it is not only extensively used as an alloy, but is rolled and manufactured in its natural state, and largely used for architectural purposes. In this country it is more exclusively consumed as an alloy for the manufacture of Brass. We consume in normal times from 10,000 to 12,000 tons, but when Brass is inactive, as it has been this year, Spelter sells slowly. In order to guard against loss the producers this year combined in March to uphold a certain price determined upon at the close of each month. In this they have at times been thwarted by lower sales of outside lots. The entire business has lacked activity, and while Europe has been steadily advancing, we have stood our ground with the Domestic article with difficulty. The quotations of Domestic, which follow, are currency, and of Foreign, gold. The year opened with a stock of but 135 tons Foreign; the price of Domestic stood 6⅝c. @ 6¾c., of Foreign 7c. @ 7¼c. A dragging business ensued, and Domestic gradually declined to 6⅜c., while Foreign was raised to 7·10c. @ 7·37½c. in consequence of the European improvement. In February some ordinary brands Domestic kept offering below the market down to 6·20c., but the better ones with a firmer feeling recovered to 6⅝c. to 6¾c., without much doing. Europe improved still further, and Foreign kept steady at 7¼c. to 7⅜c. Some more business resulted in Domestic in March without improving the price, which closed at 6½c. for best brands, and 6·20c. to 6¼c. ordinary ones. Some Foreign sold at 7c., and at the close 7¼c. was asked. The combination alluded to above was now formed, and after some 50 to 75 tons were still sold at 6½c. to 6⅝c., early in April, the price was raised to 7c. @ 7¼c. Consumers, however, did not take readily of it at the enhanced figure, and the month remained a quiet one. Europe, after a slight recoil, recovered somewhat. Domestic closed at 7c. @ 7½c., and Foreign at 7c. @ 7¼c. Early in May European limits were raised once more to 7¼c. @ 7⅝c., while Domestic was fixed at 7¼c., 30 days, or 7·15c. for cash. The month remained excessively dull without change in Domestic, while Foreign advanced to 7⅝c. @ 7½c. Producers in Silesia now declined to sell ahead. No improvement in the demand occurred in June, and while Domestic remained weak at 7¼c., Foreign, with a rising tendency in Europe, was fixed at 7¼c. @ 7½c. The combination people, nevertheless, thought fit to raise the price for Domestic to 7·45c., 30 days, or 7·35c., cash, without effecting sales to speak of in July, outside lots selling at 7½c. Foreign was reduced to 7⅜c. @ 7½c. Europe quiet, but firm. Perceiving that it was useless to attempt forcing the metal at a high price on an unwilling market, the price for Domestic was now lowered by the combination to 7¼c., less 1 per cent. Even at the reduction it remained difficult to move in August, outside lots selling at 7·10c. @ 7·12½c., 30 days. Small sales of Foreign were made at 7½c. @ 7¼c. Europe had become dull. In September the outside lots ceased to be offered, and a somewhat improved feeling manifested itself without resulting in much activity. Outside of New York 200 tons Domestic had still been placed at 7¼c. In Europe activity and an upward tendency, both in England and Germany, had been re-established. Foreign remained quiet and steady here at 7½c. @ 7⅝c. In spite of the little doing in the brass regions, the combination deemed the moment opportune for raising the price again to 7·40c., less 1 per cent., toward the close of October, during which month but a moderate trade had been done at 7¼c. Foreign remained inactive at 7·15c. @ 7·37½c. The demand for and scarcity of Spelter in Europe continued. Early in November some outside lots of Domestic still sold at 7¼c., but after they were removed, a moderate demand manifested itself at 7·40c., less 1 per cent. Throughout the month Foreign had become more active at 7·15c., 7·25c. and 7·40c. Toward the end of the month news reached us from the West that matters did not work smoothly in the combination camp. Whether true or not, it was asserted that outside lots sold at a much larger discount than the official one. Very little transpired in Domestic Spelter during December, the price remaining nominally 7·40c., currency, less the discount for cash, at the close. Of Foreign some 70 tons sold, the range of value remaining 7·15c. @ 7·37½c., gold, at the close, with a stock of 145 tons. The import, according to Mr. Wm. Paulsen, of this city, has been 540 tons, against 1050 and 2525 in 1874 and 1873. The average annual import from 1862 to 1874, inclusive, was 3405 tons. This shows how rapidly the Domestic article supersedes the Foreign one in our midst.

LEAD.

Common Domestic Lead, which had done well last year in spite of the panic and the government supply, proved a sore disappointment during the present one. This has been mainly due to the decreased building trade. It is difficult to determine how low the price might have gone but for the large purchases made by one of the leading consumers on the one hand, and by one of the principal importers and dealers on the other. Some people anticipated 5c., gold, and below. Europe has been steering a course pretty much the opposite one to ours. When the restoration of a monarchy took place in Spain, early in January, and pacification seemed at hand, it was considered more than likely that Spain's productive capacity would recover to such an extent that Europe would be flooded with Lead. But these erroneous views were promptly dispelled; it was soon perceived that Spain would not produce beyond 65,000 tons, and that the prolongation of the Carlist war would retain much Lead for war purposes in the Peninsula. Soon after the armament mania again seized upon the warlike nations of Europe, they all bought lead, and Russia alone drew from Western Europe 15,000 tons. The rebellion in the Herzegovina increased the demand. Subsequently the approach of winter caused it to subside. This state of affairs on the other side and high prices there virtually isolated our market, causing Soft Domestic for corroding purposes to command a proportionately high value among us, while Common Domestic, for the reasons given, remained depressed.

In following the fluctuations we do not repeat that all prices are gold, except Western or Missouri Lead at St. Louis and here.

January opened with a stock here of 3000 tons in private and 2000 in government hands. Domestic, at the outset, stood 6·12½c. @ 6·20c., but gradually gave way, closing at 6c. @ 6 1-16c. Sales of the month footed up 485 tons. In Europe, for the reasons given, quite a little break occurred, especially at London, 2/6, and at Marseilles, which dropped to 53 francs, Foreign here from 6⅝c. improved to 6¾c. In February the severe winter hampered trade, and a dragging market ensued, carrying the price to 5·85c. @ 5·90c. Sales, 615 tons. Foreign ruled unchanged. The decline in London was fully 15/. In March statistics came to hand from Missouri, according to which the State turned out in 1874, 35⅝ million pounds, against 27 in '73; 20⅝ in '72, 13⅜ in '71 and 14⅓ in '70. A better feeling gradually developed here, with more doing, without leading to any improvement, prices declining from 5¾c. to 5⅝c., and 425 tons selling, when toward the close of the month it transpired that one firm had got under its control 2600 tons Selby, causing the market to close at 5¾c. Foreign remained steady at 6⅞c. In Europe a great bear attack was made, and Marseilles declined to 50 francs. In April pretty low offers of Lead were made from the West, but subsequently withdrawn, the bad state of the roads impeding transportation. From being inactive at first the market assumed more vitality later on. Sales, 394 tons; price, 5·80c. @ 5·90c., closing at 5·87½c. @ 5·90c. London, after dropping to £20. 10/, now began to look up, recovering 5/. Foreign remained inactive here at 6½c. @ 6¾c., at which latter figure it closed. During May it was conceded on all hands that the spring trade in building materials had proved a failure, yet Lead was considered cheap, and consumption developing in other branches, some little activity was displayed. Sales, 300 tons. Price steady at 5·90c. @ 6c. Foreign from 6¾c. rose to 6⅞c. @ 7c. In Europe governments had now commenced to buy in good earnest. June opened among us with a stock of 2500 tons in private and 2000 in government hands. A moderate demand prevailed, and in lots 100 tons changed hands, when during the third week it transpired that a large consumer had bought 3500 tons spot and futures, including all Selby on hand and to come for 90 days, 700 Western and 200 Newark, leaving at the end of the month but 1500 private and 2000 tons government stock. The price paid for this large purchase was supposed to be 5¾c. From 5·90 the price here improved to 6⅛ @ 6¼c.; Foreign remained 6¾ @ 6⅞c.; Europe recommenced to weaken, Spain shipping largely. July, with its midsummer lull, spread universal stagnation in the Lead business, and as no new feature was likely to arise, the feeling became one of apathy and indifference. Sales 390 tons; price 5·95 @ 6c., throughout; Foreign, 6¾ @ 6⅞c. While in Europe the arrivals from Spain were liberal, the war demand readily absorbed them. In August the West made some heavy Lead shipments direct to places East, and Utah and Nevada forwarded increased amounts of bullion; St. Louis advanced, but our own market was not stirred up. Quotations here ranged between 5¾ and 6c., closing at the inside figure. Sales 350 tons. Foreign kept steady at 6¾ @ 6¾c. Europe remained firm throughout the month. According to the accounts which reached us early in September the floods had greatly crippled mining operations at the West. At the same time it became evident that with a resumption of White Lead manufacture on a normal scale we should be found deficient in the suitable kinds for corroding purposes. We usually consume 45,000 tons of White Lead, and it was calculated that we should be able from domestic sources to furnish but 30,000 tons toward it. Still, the market here remained as sluggish as before; sales 440 tons at a gradual decline to

5·70c. @ 5·75c. In Europe both Russia and France bought largely for armament, and Foreign was advanced here to 7¼c. In October receivers of Lead showed more willingness to part with it on exceedingly moderate terms, and larger dealings resulted therefrom, summing up at New York some 775 tons at 5⅛c. @ 5⅝c., closing at 5⅝c. @ 5·70c.; beside 1000 to 1200 tons select Western were placed along the coast at 7⅝c., currency. The prospect for obtaining bullion out West had improved somewhat. Foreign here 7⅛c. @ 7¼c. Europe remained steady. November opened languidly at 5·65c., but during the third week the spell of dullness was at length broken. While Europe after the close of navigation in Russian ports began to give way, the situation here underwent a favorable change, sales summing up 2675 tons spot, and to arrive at gradually improving rates, rising from 5⅛c., to 6c., and including some Western at 6·85c., currency. On Foreign the limits were reduced ⅛c., from Europe. In December the market quieted down again, sales aggregating 525 tons Domestic at 5·90c. @ 6c., gold, closing at the inside figure. Soft Missouri closed at 7⅝c., currency, and Foreign at 7⅛c., gold, both nominally.

BUSINESS ITEMS.

MAINE.

Getchell & Sargent's machine shop and foundery, at Machias, has shut down for lack of work. This is the first time the works have suspended for thirteen years.

MASSACHUSETTS.

A large engine lathe was recently shipped to New York from the Putnam Machine Company, Fitchburg. It is thirty-three feet long, with nine feet swing over the bed, and has a plate over the back end to make a pit lathe with twenty feet swing. The spindle and face plate for the head stock weigh 22,000 pounds, and the entire weight of the lathe is 40 tons. Four platform cars were required for its transportation.

The repair shops of the Boston, Clinton and Fitchburg Railroad are to be run nine hours a day instead of ten, and all the help retained.

Clark & Chapman, Turner's Falls, are about to add brass founding to their works, putting in two "pots" in their foundry to accommodate their own business and the local trade. They have just sold two of their largest fire pumps to the Hartford Paper Company and W. C. Hodge, both at Poquonuck, Ct.

Weymouth Iron Works are now working three days in the week instead of four as heretofore.

RHODE ISLAND.

There are seven houses at Pawtucket engaged in the manufacture of leather for factory use. The tanning of belting, lace and picker leather is made a specialty, to the exclusion of other kinds. Business is at present quite still, but it is expected to become brisk after the middle of January. At present the work is mainly on lace and picker leather. Most, if not all of the tanneries, contain shops to manufacture the stock produced into belts, &c. Some of the firms make moccasin leather to a considerable extent, which finds buyers throughout the North and West and in the British Provinces. The tanneries in Pawtucket use from 3000 to 15,000 hides each, annually, aggregating in the neighborhood of 60,000. The factory leather goes to all parts of the country, quite a considerable amount to Canada and the Provinces, and a little to Europe. That which goes abroad generally goes through the hands of the machinery people.

CONNECTICUT.

It is reported that Jeffers' Fire Engine Works, Pawtucket, are to be removed to Bridgeport.

Smith & Egg, Bridgeport, are turning out padlocks for the government at the rate of 1500 per week.

The Bridgeport Brass Company have been running for ten years, and at present are employing 200 hands. The buildings consist of a main factory 116x130 feet and 3 stories high, with several outbuildings. The company make a specialty of rolled brass wire and tubing, the entire establishment having a capacity equal to the production of 1,000,000 pounds of brass goods per year.

The Eaton, Cole & Burnham Company, manufacturers of gas and steam fittings, Bridgeport, were established in 1863, though they have been running under their present style for only a year. The goods manufactured by this house beside being sold in all parts of the United States are exported largely to Cuba and South America. The factory is 180x35 feet, and 3 stories high with a basement and an L 125 feet long, the iron and brass foundries being each 100 feet long. Among the products of this establishment are malleable and cast iron fittings, iron and brass valves, gauge cocks, steam whistles, oil cups, hose pipes, &c. The company also manufacture Snow's direct and indirect radiators.

The Tomlinson Spring and Axle Co., of Bridgeport, have about 200 laborers employed, with a capacity of about 700 pair of springs per week. The material used is imported.

NEW YORK.

The *Commercial Bulletin* of the 25th inst. says: "We are requested to correct an erroneous item which has been going the rounds of the newspapers in regard to the Syracuse Iron Works. Instead of having only three double puddling furnaces, as stated in the item referred to, the company have for a long time had four double puddling furnaces, and one single one. They will soon have one of their new patent revolving tilting mechanical puddlers in operation, when they expect to supersede the old method of boiling. They have five heating furnaces, and with plenty of work all are running double turn. The company use about 4000 tons of pig iron and 2000 tons of scrap per year. They have run steadily up to the present time, and are now turning out their usual quantities of iron specialties."

PENNSYLVANIA.

Dunbar Furnace, Fayette county, has recently been thoroughly repaired, and is now doing good work. There is about 5000 tons of ore in stock, and the daily capacity of the mines is 150 tons. About 1000 tons of limestone are quarried and stacked and some 5000 to 7000 tons shipped.

The Reading *Times* says that there are thirty thousand tons of iron ore ready for shipment at the mines of the Philadelphia and Reading Coal and Iron Company, at Siesholtzville, Berks county. The mines have suspended operations in accordance with the order recently received from headquarters. The mines had been steadily in operation since 1873, and an immense quantity of ore had been mined during the last three years. The accumulated ore is now being distributed to the different furnaces, some eighteen teams being used to haul the ore from the mines to Red Lion station, a distance of one and a quarter miles.

Natural gas has been introduced into all departments of the works of Spang, Chalfant & Co., Pittsburgh, and they have discharged their ash wheelers and coal train men. This is an economy that has not heretofore been mentioned in connection with the use of gas in metaliferous works.

The Wheatland Mills and Blast Furnaces, Wheatland, Mercer county, are to be sold at auction on the 13th of next month. This property is favorably situated on the line of the Erie and Pittsburgh Railroad, beside having track connections with the Atlantic and Great Western Railroad. The furnaces and rail mills are in good order and ready for immediate use, and the buildings are in good condition, the larger portion of them having been erected recently. The property in detail consists of 4 blast furnaces, capable of producing 600 tons of pig metal weekly; 1 rail mill, nearly new, with all modern improvements, and capable of producing 1000 tons of rails weekly; some 220 buildings, consisting of tenement houses, managers' and clerks' houses, brick and frame offices, carpenter shop, store, locomotive house, ice house, stables, &c., together with about 325 acres of land, three-quarters of a mile of railroad track, switch, siding, &c., and 800 shares, being two-thirds interest of the Shenango Coal Company Stock, together with certain leases and royalties on coal in mines now being operated by the company.

Stewart & Stevens, Philadelphia, have the contract for the wrought and cast iron work for the first floor of the new United States post-office building in that city.

Emma Furnace, Union Iron Company, Pittsburgh, is producing an average daily yield of from 45 to 47 tons of metal from thin ore; with good ore the yield is from five to seven tons more.

Emerson, Ford & Co., Beaver Falls, are filling orders from New Zealand for their planer-tooth saws.

A Pittsburgh firm engaged in the manufacture of hardware, have orders for samples of their goods to go to England.

Porter, Bell & Co., Pittsburgh, are constructing a light locomotive for exhibition at the Centennial.

A new set of rolls in operation at the Beaver Falls Cutlery Works delivers blanks for knife blades beveled ready to polish. This greatly reduces the labor as compared with the common methods of hammering.

Nearly 10,000 tons of pig iron were shipped during November by the furnaces in Allentown.

Barber & Co., Allentown, are building a 30 horse-power engine and tubular boiler for a sash factory at Easton.

Work has been resumed by the Nimson Steam Forge and Axle Works, Allentown.

The West Middlesex Manufacturing Co. is now turning out 30 stoves per week, beside other work in abundance.

There was a general stoppage of work in the shops of the Reading Railroad Company on the 16th inst.

A reduction in miners' wages has been made at Arnot, Tioga county, of five cents per ton of coal mined, and twelve and one-half cents per yard.

The iron business is improving about Coatesville. The *Union* says the mills are all busy.

The old furnace at East Conemaugh, Cambria county, is being refitted for the purpose of manufacturing spiegel iron. It will soon be ready to go into blast.

The *Commercial*, of the 22d, says that about six months ago a Chicago firm, engaged in iron manufacture, sent representatives to Pittsburgh, and in a quiet way established on Central Way an enterprise by which cinder and other refuse matter from iron furnaces is utilized. The cinder is collected from the various furnaces, and by a process, known only to the company and its employes, the valuable portions are taken from it and manufactured into iron. The refuse matter which they use has heretofore been thrown aside by furnace men as useless, but this company think they have succeeded in effecting an operation by which a good profit can be made at it. The company have similar works in Louisville, Indianapolis, Chicago, Cincinnati and Boston, where they are carrying on the operation quite extensively.

The Gibbs Sterret Manufacturing Company, Titusville, have a new furnace for utilizing scrap iron. The company are about to order a new 2500 pound steam hammer.

OHIO.

The Lake Erie Iron Co.'s Mill, Cleveland, is running on small orders, and as these orders continue to be received the mill will remain in operation except during the short period required to take stock, which will be begun in a few weeks.

Work on the Cleveland breakwater has progressed sufficiently to admit of placing the pile driver on the piles already driven, and the work will be carried forward during the winter, except during the prevalence of extreme inclement weather.

The Phœnix Furnace, Youngstown, Brown, Bonnell & Co., proprietors, is under the management of Job Frogget, and is doing splendidly. This furnace has a bosh 16 feet, and is 60 feet high, and is running on Bessemer, making about 350 tons per week. On Tuesday last the yield was 57¼ tons, which is certainly very extraordinary work, taking into consideration the size of the furnace and the material manufactured. This furnace is now filling an order for 1800 tons from an Eastern firm. Falcon Furnace, belonging to the same firm, is making about 42 tons mill iron per day. This is a small furnace, 13 feet bosh and 55 feet high.

Homer, Hamilton & Co., Youngstown, have commenced the manufacture of sash weights for the Youngstown Sash Weight Company, thus giving employment to quite a number of their old hands who have been idle, or on half time for the last two months. The firm have just completed a 7 inch train for the Youngstown Rolling Mill Co. The bed plate weighs 7200 pounds. The train will be placed in position in the mill in a few days, an addition having been lately built for its accommodation.

The Glencoe Iron Works, Youngstown, Arms, Bell & Co., proprietors and manufacturers of nuts, washers and bolts, are running nearly full time. These works were idle for a while, waiting on iron for a special order. After the holidays they expect to run regularly and with a full force.

The Cincinnati Iron Bridge Co. have just closed a contract to build a bridge at Lansingburgh, N. Y., from the mainland to an island, 480 feet.

The Cuyahoga Steam Furnace Company was chartered March 3, 1834. They have occupied continuously the same building, which was erected in the year 1834; extensive additions and improvements have since been made, and the nature of the work carried on has been entirely changed. At first a stove foundry, afterward a manufactory of plows and other agricultural implements, and finally, as the exigencies of the times seemed to justify and require, devoted wholly to the building of marine and other steam engines. These changes were brought about gradually, the latter branch of industry, to which these works are now devoted, having been adopted at a comparatively early date in the history of the company, and the present reputation of the works has been the result of years of successful engine building.

There is a high pressure gas well next Walhonding, in Coshocton county, which emits a great quantity of gas that is now being used in the manufacture of lamp black.

The new oil field at Grafton, where heavy oil is found at the depth of 90 feet to 100 feet, has attracted a number of operators from the oil region. The oil closely resembles that found in the vicinity of Mecca, Ohio, and is just now selling at $10 a barrel.

The Grangers of Northwestern Ohio have decided to make Lima a distributing point for agricultural machinery and other articles, and will erect a building for the purpose.

L. T. Clark, formerly superintendent of the Blandy Engine Works, of Newark, is the lessee of the Mt. Vernon Iron Works.

INDIANA.

The Indianapolis Rolling Mill is engaged in rerolling several hundred tons of iron for the Indianapolis, Peru and Chicago Road.

The Terre Haute Iron and Nail Works now employ 30 men. They are now enlarging their works.

The New Albany Steam Forge Works have closed a contract with the Erie Railway Company to furnish them about 1000 axles.

The Atlantic Iron Works, Messrs. Kimberly, Carnes & Co., Sharon, are in full operation, running double turn, with prospects of continuing to do so.

The Westerman Iron Works were running full last week, with the exception of the puddlers and the nail factory. This week the whole business will be in full blast on orders.

During its fiscal year ending Nov. 30, the Indianapolis Rolling Mill was in operation 221 days, and turned out 15,322 tons of iron rails. The mill is now undergoing repairs, and a pair of shears weighing 18 tons is now being put in.

ILLINOIS.

The Chicago and Northwestern Railway car shops, in the suburbs of Chicago, are now so nearly completed that they will be in running order in a very short time. A new boiler shop for the locomotive department has just been finished. This department will employ 400 men. The old car shops in Chicago will be abandoned. The company is now building two baggage cars 40 feet long, with 4-wheel trucks, and one 50 feet long, with 6-wheel trucks, also a 46 foot passenger coach.

KENTUCKY.

An order from the Louisville Plate Glass Manufacturing Company has lately been received by Totten & Co., Pittsburgh, Pa., for a cast and plane plate 20 feet long, 10 feet wide and 8 inches thick, which will weigh when finished about 70,000 pounds.

OREGON.

The shipbuilding interest of Oregon is making rapid strides forward, and promises soon to grow into extensive proportions and give employment to many hundreds of men. Several vessels of large carrying capacity are to be placed in course of construction soon, so as to be in readiness for the wheat crop of 1876. The timber is now being cut and seasoned, and is carefully selected from the best yellow fir. The fastenings are purchased at the lowest cash prices in the East, and sent round the Horn, by which method they are laid down at the yards at a fractional cost only over that paid by Eastern shipbuilders.

MICHIGAN.

Seven car loads of copper were shipped over the Marquette, Houghton and Ontonagon Railroad during the week ending Saturday, 18th inst.

The following items are from the Marquette *Mining Journal* of the 25th inst.: Bancroft Furnace is still blowing, and will probably continue in blast all winter. Both stacks of the Pioneer Furnace are blowing, and both are doing good work—the daily average of each being about 30 tons. From eight to ten teams are employed at the present time in hauling copper from Houghton to L'Anse. Each barrel weighs some 1360 pounds, and three of them are considered a good load. The fires of No. 2 stack of the Fayette Furnaces were extinguished on the 4th, and No. 1 was blown in four days after. No. 2 made on her last blast 5663 tons. The shipments for the season last past are given at 14,075¼ tons.

MISSOURI.

The St. Louis Galvanizing Company, Eleventh street near Clark avenue, with the exception of a slight breakage, has been doing a fine business since its start. The mill has been working up to its capacity of 5 to 10 tons of first-class corrugated car or house roofing sheet.

Mines, Metals and Arts says that the Car and Foundry Company since its removal to East St. Louis, has made many most advantageous improvements. The latest intended improvement announced is the introduction of gas into their shops; for this purpose it will require 500 burners to accommodate the various departments. Reports say the company have a good amount of work.

Harrison Wire Mill, St. Louis, is running full on double turn. The changes and improvements that are going on have reference to the making of blooms and wire billets from the pig. Heretofore a supply of billets has been procured from good market scrap, but that source of supply is too irregular to meet the entire wants of the mill. Hence the erection of a set of puddling furnaces. One hundred and fifty men are employed.

Rohan & Bros., St. Louis, have a fair quantity of new work in the boiler shops, and more repair work than is comfortable. G. B. Allen is having a fine heating and hoisting boiler made for his new building corner Seventh street and Washington avenue. Dimensions, 20 feet long and 48 inches diameter, with 12 6-inch lap welded flues. The firm are building a steel boiler for Capt. Parr, of Tennessee, for his new boat; the fore and aft seams of the work are to be double rivited, with 10 lap welded flues. The chimneys of the boat will be of galvanized iron. They are also building a locomotive fire box boiler for one of our lead mining companies.

NEVADA.

At the Mill City Foundry over 6000 pounds of shoes and dies were cast during the week ending December 11, for John C. Fall, of Unionville. The *Silver State* says that a large crane for the purpose of raising heavy castings has been erected and the foundry improved generally.

CALIFORNIA.

The *Scientific Press* says that a cargo of ship spars are being delivered at Olympia for shipment direct to Newburyport, Massachusetts.

CANADA.

A gigantic new bridge is about to be built across the St. Lawrence, Montreal, to accommodate street cars, carriages and foot passengers as well as railroad traffic. A viaduct 4800 feet long, in twenty spans, will conduct from Sherbrooke street to the river; five spans of 600 feet each will cross the river to St. Helen's Island, which will be traversed by a viaduct with twenty spans of 120 feet each, while twelve spans will cross the unnavigable channel south of the island. The bridge will be 130 feet over the level of the river.

European Armaments.

A critic in a late number of *Blackwood's Magazine*, on the condition of the French military system before, during and since the war with Germany, gives such a picture of the stupidity, neglect and official humbug and emptiness characterizing the French imperial management that those who are accustomed to believe the European military systems wonderful in the perfection of their details would be amazed at the reality. It is unfortunate that the French works from which these accounts are collected have never been published in America. But they are all authentic, some being official reports of governmental investigating commissions, some the reports of generals, and some being books written by French officers. Not only was the French military system in decay, but for five years before the war the fact was familiar to the generals in command, and the most determined efforts had been made by some of them to induce the war department to remedy deficiencies, but without the least effect. All the printed reports showing the remarkable extent of the French military system were deceptions, not only as to the number of men, but as to the arms, munitions of war, transportation, clothing, food and about everything relating to armies. Whole divisions of zouaves were sent to Algeria to get their uniforms and sent back again to fight. Over one hundred thousand men straggled off from the trains at the railway stations and subsisted by beggary and plunder. Men were sent to fight the Germans, with Chassepots they had never been taught to use, and with mitrailleuses that no one knew how to work. Among the cannon that figured so much on paper were some dating back to the time of Louis the Fourteenth, and at Strasbourg there were actually stone cannon balls of that era. There were artillery trains without horses to draw them or men enough to use the pieces, and in one case the gateway through which the material had to pass was so small and the accumulation so large that it would take eight months to empty the place.

When war actually came everything was deficient, and for a time there was danger of starvation of some of the divisions. The main fault was that the imperial regime had substituted empty and stupid formalism for efficient service. The neglect of the sick and wounded soldiers was horrible. In fact, all that was said of the miserable management of the English in the Crimea is expanded tenfold in these French accounts of the amazing ruin of their whole military system. No one who reads the accounts can feel inclined to think the French defeats resulted from superior generalship on the part of the Germans. For none of our own armies in the civil war ever were half as raw and ineffective as nearly, if not quite all, of these long-boasted French armies proved to be. The beginning of this decay had been perceptibly seen in the war with Austria and Italy, where the losses were much greater from disease and neglect than from actual casualties. In a free government the details would have been overhauled and exposed, but in the Bonapartean despotism this was not allowed.

There could be no more impressive political lesson than is afforded by the picture presented by these French works. France had paid liberally for a great standing army, and on paper the numbers of the men and the amount of material of war were tremendous. But as the deception is proven to have been complete and the money was nevertheless appropriated and used in some way, it is obvious that this show was kept up as an excuse for squandering these millions of money on court splendor, on imperial favorites, on corrupting elections and the control of public opinion. There is no resisting the conclusion that a large part of the money was fraudulently applied to their own use by officials both in the army and the civil service. This would account for the extreme difficulty of curing the astonishing evils of the War Department. But the truth is that despotism had effectually crushed out the spirit of individual freedom of action in office, so that the French military system had become a mere shell. How great an injury had been done in the same way to the entire French service, and the people was afterward shown, under the Republic, when the furious energy of civilians, lead by Gambetta, produced an immense armament, and supplies in abundance, as well as men, but could not make generals fit to command.

If it be said that this is an old story, and an older moral drawn from the corresponding neglect and decay of all former military systems, it must still be urged that events in France, England and America prove that in a free country, where the popular mind is left free to investigate and expose everything, the work of preparation for actual conflict is more efficient than under any form of government where that freedom is denied. Of course, the reply to this would be a reference to the extraordinary German successes under a despotic government. Nothing can be argued from these victories, for the late French empire was just as victorious for years. And a strange fact is mentioned in Blackwood that is rather suggestive. This is, that although the immense preparations for provisioning Paris were well known in England, they were wholly unknown to the commanders of the German army, and that upon the arrival of the latter to commence the siege, they were surprised to learn the fact. Even then they could have taken the city by assault, for the effective defences were only completed subsequently to the investment. We have as yet no inside view of German management during this war. Whether Germany is stronger or weaker for the absence of such searching examinations remains to be seen. In France the self-analysis has been unsparing, and that the country is the better for it we see in the uneasiness of Bismarck.

We are, however, constrained to add that the Blackwood article does not consider the evils of the French system cured altogether, though it is admitted that great progress has been made. The charge is that the army officials are devotees of routine, and that very much of what passes for efficiency is mere parade and show. The country is deceived by reviews and reports and statistics, and the high officials are mostly incompetent. In the German war France had the disadvantage of being arrayed against an antagonist whose military system had been carried to the highest state of efficiency in the Danish and Austrian wars. The men were mainly veterans, and the machinery of action was on the greatest possible scale. But on comparing these accounts of the French army with our own in the civil war, our opinion of American war forces is considerably raised, and we are not inclined to believe that the armies of Grant, Sherman, Lee and Johnston would have been worsted in a conflict with any of the armies concerned in the Franco-German war. Sheridan, who was present with the German staff in some of the battles in France, was of the opinion that none of the forces in the field there were superior in any respect to our own.—*North American.*

Brooklyn's Water Supply.—Commissioners Adams and Fowler, of the Brooklyn Board of City Works, had a long consultation on Tuesday morning with Chief Engineer Adams in regard to the increased water consumption of the city, and the inadequate supply. It was stated that on Dec. 18, 38,148,318 gallons of water were consumed, while on the same day last year the quantity was only 23,106,811 gallons. The board some days ago ordered the pumps at Smith's Pond to be put in use, thus securing an additional 2,000,000 gallons per day. The Hempstead reservoir has been largely drawn upon, and now contains a depth of water less than five feet. Ten days ago there was a depth of nine feet. In the pump well there is six feet, and about 16 feet in Ridgewood Reservoir, making the total quantity on hand equivalent to only five days' supply for the city.

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We have never before made anything which sold so readily, and gave such universal satisfaction. Where one is sold in a neighborhood, it makes a demand for many more. We have now sold 40,000 of them and have not yet heard one complaint, but we have a large number of letters expressing great satisfaction with them. We have advertised them largely and thereby created a demand in every part of the country.

The list price of Rosewood Frames is $1·25 each, and of Birch $1·00 each, with the same discount that we make on our Barber Bit Braces. Price of Saw Blades, $1·20 per gross net.

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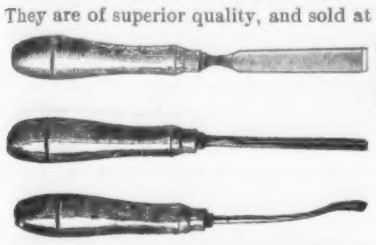

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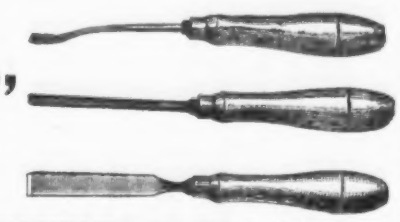

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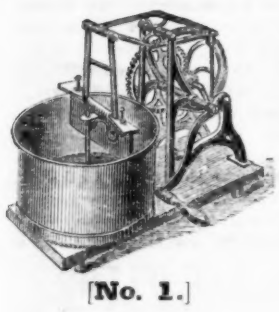

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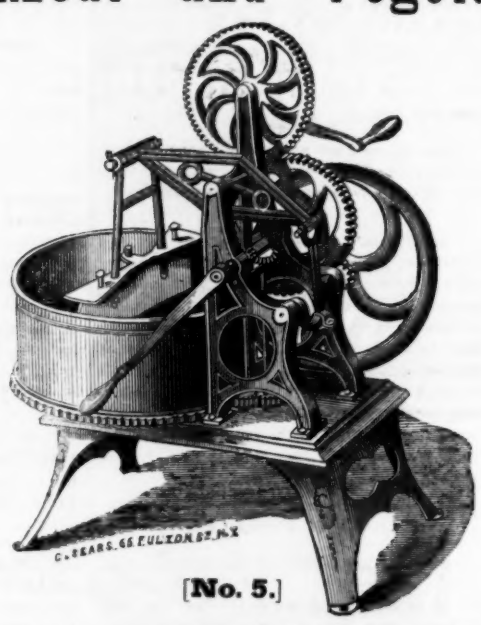

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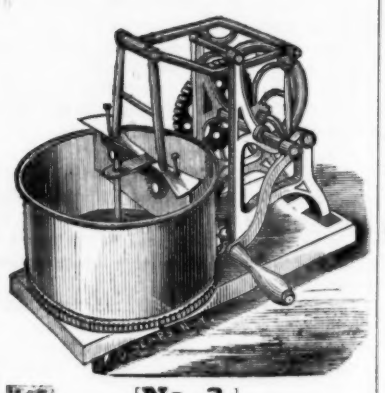

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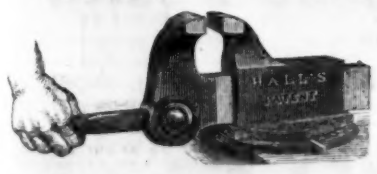

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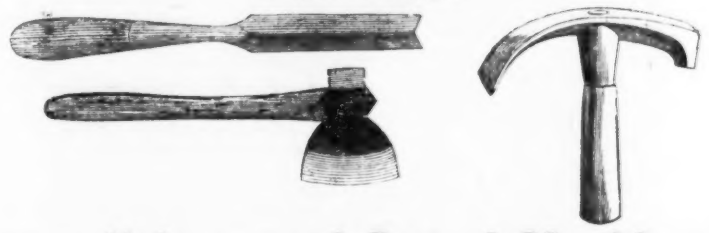

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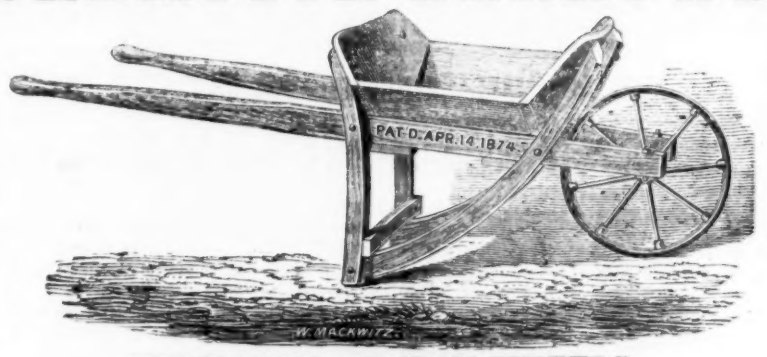

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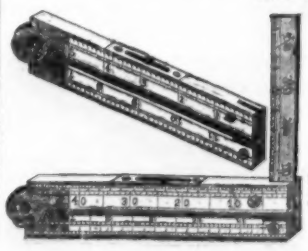

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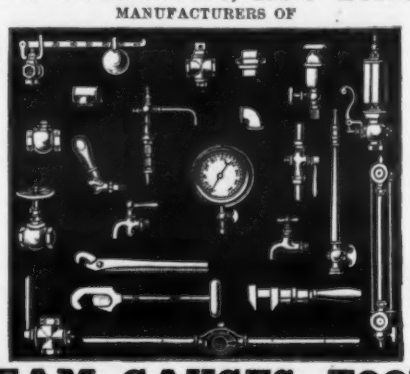

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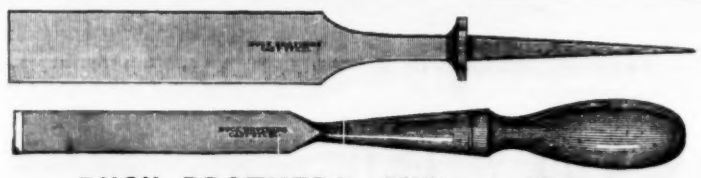

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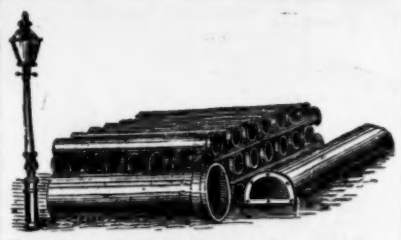

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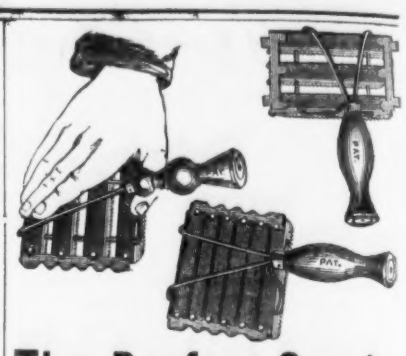

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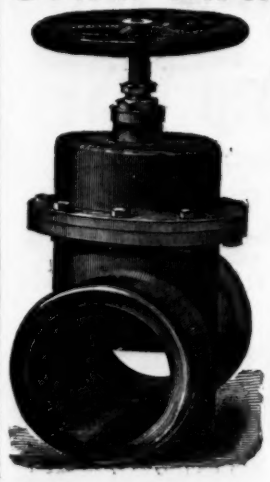

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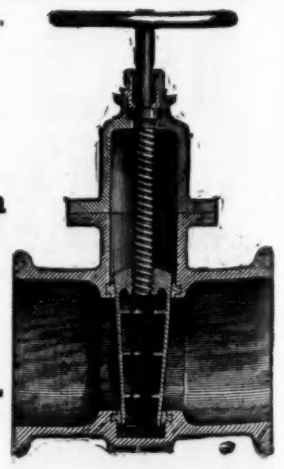

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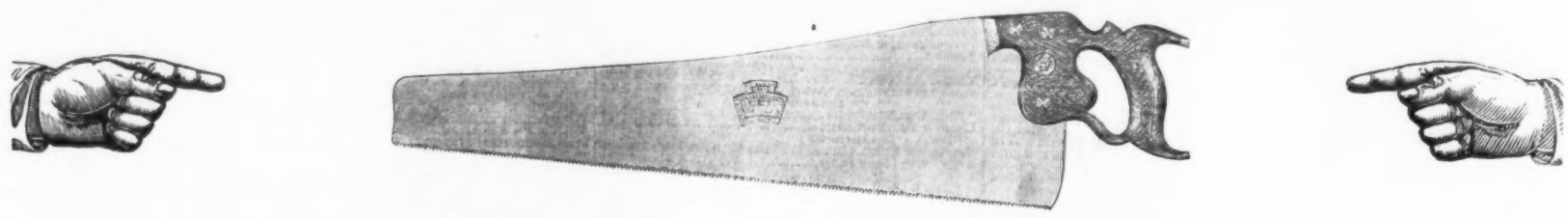
Henry Disston & Sons New Patent Skew Back Hand Saw

"CENTENNIAL No. 76."

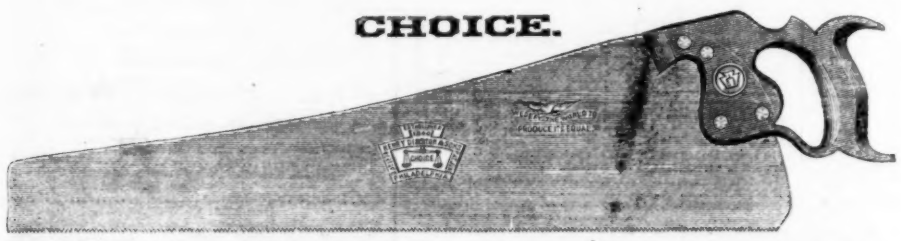


TO THE HARDWARE TRADE.

GENTLEMEN: We are prepared to supply the trade with an entirely new Hand Saw, called the "Centennial No. 76." This Saw is ground on the back, to taper gradually from butt to point, being only 26 gauge at the point. By this mode of grinding, the Saw, when tested, makes a complete "whip bend." The handle is apple-wood, oil finish, the screws are flush and polished, and the Saw is superior to any ever offered to the trade in this or any other country at the price. It is the sweetest-cutting, nicest-hanging Saw that can possibly be manufactured, feeling as light as a feather at the point, owing to its peculiar construction. The screws are finished before being put into the handle, and, should they become loose, can be readily tightened with an ordinary screw-driver, and still make a good finish. It was our intention to keep this Saw from the market until Centennial year; but second thought has decided us to give the trade an opportunity to test it before then, that they may know whether they can put it in stock without risk. The price of this Saw at present will be the same as that of the regular No. 7. It is a "hard times" Saw, and we do not know how long the price can be sustained. Mr. Henry Disston is willing to risk his reputation as a Saw-Maker upon "the Centennial No. 76." Send for samples and put them in the hands of the Carpenters—to be returned if not as represented.

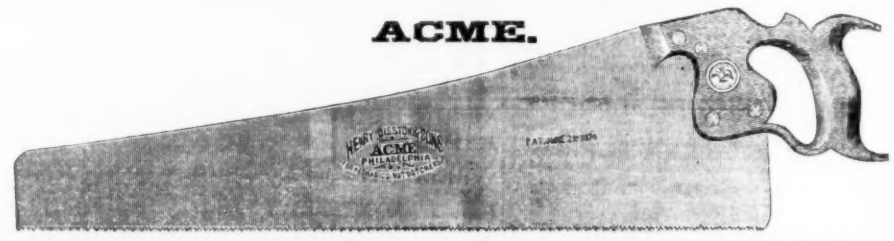
November, 1875.

HENRY DISSTON & SONS'
New Patent Skew-back Hand-Saw,
CHOICE.



This Saw is the "CHOICE" of all first-class Mechanics who have used it.

HENRY DISSTON & SONS'
New Patent Skew-back Hand-Saw,
ACME.



We consider these Saws to be the ACME of perfection. So say all first-class Mechanics who have used them.

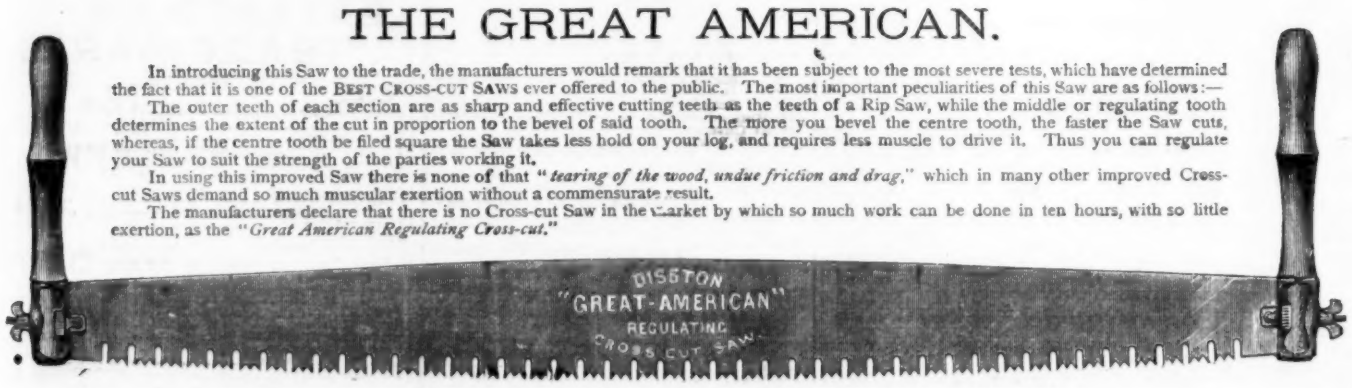
THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—

The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.

In using this improved Saw there is none of that "*tearing of the wood, undue friction and drag*," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.

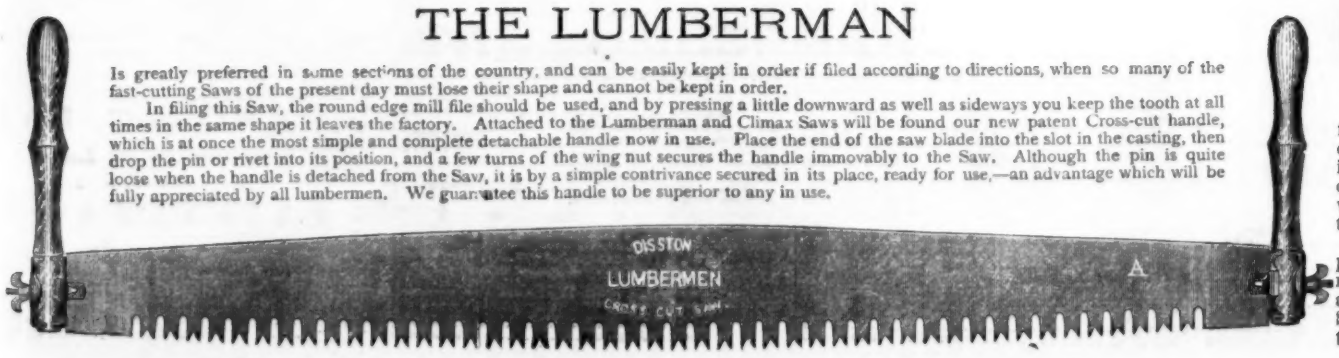
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "*Great American Regulating Cross-cut.*"

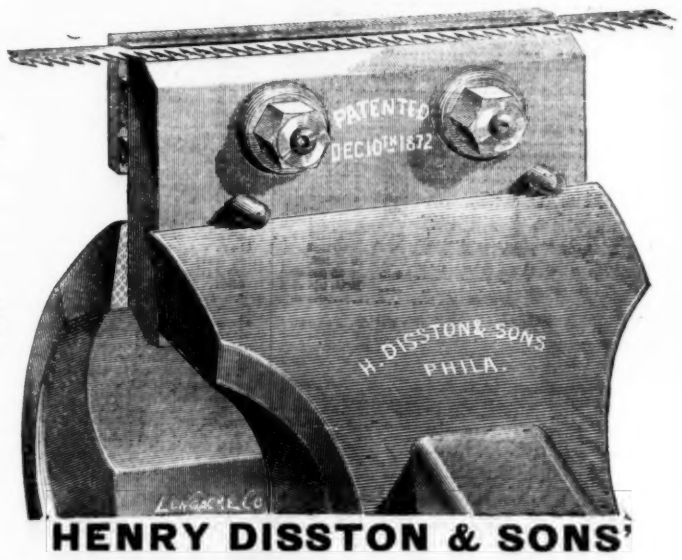


THE LUMBERMAN

Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.

In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.





HENRY DISSTON & SONS'

Patent Setting Stake

For Setting Web, Jig, Band or any kind of Narrow Saws.

The principal difficulty experienced in setting a narrow Saw arises from the fact that the blade is liable to tilt or slide backward as each successive tooth is struck by the hammer. The back guide with its projecting lip, under which the Saw passes and is securely held during the process, effectually prevents these difficulties and holds the Saw up to its work; thus the operator is enabled to strike the tooth with certainty every time, and prevents any distorting of the saw blade.

The guide can be adjusted to various widths, by inserting or removing packing, as occasion may require. Either edge of the set can be used by reversing the back guide, and as the edges are of different sizes, they are adapted to Saws of different widths. A narrow Saw set by the aid of this Stake remains as straight after as before; a result which cannot be attained by any other means.

New York Wholesale Prices, December 29, 1875.

HARDWARE.

Anvils.
Wright's ... ₩ lb gold 10¾c; over 250 lbs 11c, gold
Armitage's Mouse Hole ... gold 11c
Wilkinson's ... ₩ lb gold 11c
Eagle Anvils (American ... ₩ lb 10c dis 20 %
Apple Parers.
Domestic / Turn Table / Lightning / Hudson's / Reading / Union } $7.75 ₩ doz
Skeleton Paring, Coring and Slicing ... $3 00 ₩ doz net
Bay State, Paring, Coring and Slicing ... $15 00 dis 10 %
Climax Slicer ... 8 00
Ash Sifters.
J. E. Corning's Barrel Head ... dis 10 %
Rival ... ₩ doz $12·00 net
Square ... per doz $2·50 dis 20 %
Augers and Bits.
Conn. Valley Mfg. Co / Douglass / Ives / Beecher (French, Swift & Co) / Griswold / Challenge } 1st quality ... dis 40&10 %
Nobles Mfg. Co ... dis 40 @ 40&5 %
Cook's ... dis 40&10&10 %
Diamond Hardware Co ... dis 25&10&10 %
Snell Mfg. Co ... dis 25 %
Jennings' Bits ... dis 10 %
Lewis' Single Twist Bits ... dis 30 %
Andrews' Bits ... dis 25 %
Griswold's Patent Bits ... dis 30 %
Expansive Bits, Clark's ... small, $18; large, $26—dis 15 %
" " Ives' ... $20 @ $30—dis 30 %
" " Blake's ... $20—dis 40 %
Hollow Augers, Douglass' / Ives / French, Swift & Co } dis 40 %
" " Bonney's Adjust. ₩ doz $48—dis 25&10 %
" " Stearns' " ₩ doz $48—dis 25&10 %
" " Ives' Expansive ... each $4·50—dis 40 %
" " Universal Expansive ... each $4·50—dis 10 %
Gimlet Bits—Screw, $7·50; no screw, $9 ... dis 20&10 %
Double Cut Gimlet Bits, Shepardson's ... dis 20 %
" " Ct. Valley Mfg. Co ... dis 30&10 %
" " Hartwell's ... dis 50 %
" " Douglass' ... dis 25&10 %
" " Ives' ... dis 30 %
Morse's Bit Stock Drills ... dis 20 %
L'Hommedieu's Ship Augers ... dis 20 %
Watrous Ship Augers ... dis 20 %
Vaughan's Post Hole—
6 in. $23 60; 7, 8 and 9 in. $25 per doz ... dis 20 %
Awls, Brad Sets, &c.
Awls, Sewing, Common ... per gross $1·20—dis 15 %
" " Best ... per gross $1·60—net
" Shouldered Peg ... per gross 2·25—dis 15 %
" Patent Peg ... per gross ·60—dis 15 %
" Shouldered Brad ... per gross 2·25—dis 15 %
Brad Sets, Aiken's ... per doz $13·88—dis 40 %
" No. 42, $10·50; No. 43, $12·50 ... dis 45&10 %
" Clark's ... dis 40&10 %
" Stanley's Excelsior ... $18 50—dis 25&10 %
Axes.
Brook's ... per doz $12 00 @ 14 00 net
Blood's ... per doz $15 00 @ 16 50—dis 20 %
Hunt's ... ₩ doz $12 50 @ 14 00
Collins' ... ₩ doz 11 00 @ 15 50 net @ dis 5 %
B. Clark's (J. C. W. & Co.) bron'd or red. ₩ doz $10 00 net
Hurd's ... ₩ doz 10 50 @ 12 50
Simmons' ... ₩ doz 11 00 @ 11 50
Norris' ... ₩ doz 12 50 @ 13 50
Red Jacket ... ₩ doz 12 00 @ 12 50
Mann's ... ₩ doz 11 50 @ 13 00
" Double Bitted ... ₩ doz 21 50 @ 22 00
Underhill's ... ₩ doz 12 00 @ 13 00
" Crown ... ₩ doz 12 50 @ 13 50
John Leverett's ... ₩ doz 12 50 @ 15 50
Ten Eyck ... ₩ doz $10 00 @ 12 50 net
M. H. Jones & Co ... ₩ doz 10 50 @ 11 50 net
Nobles Mfg. Co ... per doz $10 50, net
Elephant ... per doz $10 50 @ 11 60 net
Axle Grease.—Frazer's ... ₩ lb 6c.
Balances ... dis 35 %
Bands.—Plated ... new list dis 50&5 %
Iron Rim ... new list dis 25&5 %
Brass (Plated list) ... new list dis 50, 10&5 %
Oreide ... new list dis 50&5 %
Bells.
Hand, Light Brass ... dis 70&10 %
" Extra Heavy ... dis 40&10 %
" White Metal ... dis 50&10 %
" Silver Chime ... dis 20&10 %
" Swiss ... dis 25 %
" Globe (Cone's Patent) ... dis 20&10 %
Gong, Abbe's ... dis 20&10 %
" Yankee ... dis 35&10 %
" Barton's ... dis 35 %
Crank, Taylor's ... dis 25 %
" Brook's ... dis 50 %
" Cone's ... dis 10 %
" Connell's ... dis 50&10 %
Lever, Sargent's ... dis 60&10&10 %
" Taylor's ... dis 25 %
" Hart, Bliven & Mead Mfg. Co ... dis 50&10 %
Pull, " " " " ... dis 50&10 %
" Brook's ... dis 50 %
" Western ... dis 25 %
Call ... dis 15 %
Cow—Common Wrought ... dis 20&10 %
" Western ... dis 20&10 %
" " Sargent's ... dis 50&10&10 %
" Kentucky "Star" ... dis 20&10 %
" " Sargent's ... dis 50&10&10 %
" Dodge's Genuine Kentucky, new list—
Nos. 0 1 1½ 2 3 4 5 6 Hog.
$12·00 10·00 9·00 8·00 6·00 5·00 3·50 2·50 5·00—dis 45 %
" Yaw's Genuine ... dis 35 %
" Texas ... dis 35 @ 40 %
Bellows.
Blacksmiths', Common, List of Sept. 15 ... dis 15 %
Extra and Pittsburgh Pattern ... List net
Moulders' ... dis 20 %
Hand Bellows ... dis 10 %
Blind Adjusters.—Domestic ... ₩ doz $3—dis 20 %
Blind Fasteners.
Mackrell's ... dis 30 %
Van Sand's, No. 2000, $14·00; No. 3705, $10·50 net @ dis 5 %
Washburn's Patent ... ₩ gross $14 00 dis 5 %
Merriman's ... new list net
Blind Staples.
Boardman's Patent, ⅜ in. and larger ... ₩ lb 37 c
" ¼ in ... " 42 c
Blocks.
Differential Pulley Blocks ... dis 25 %
Tackle, Rope and Iron Strapped, Providence Tool Co.'s list ... dis 30 %
Burr's ... dis 10 %
Stanley Rule and Level Co ... dis 25&10 %
Bolts.
Cast Iron Barrel, Shutter, &c ... dis 60&10 %
Cast Iron Chain ... dis 60&10&10 %
Wrought Iron Barrel ... dis 50, 10&10 %
" " Square ... dis 50, 10&10 %
" " Shutter ... dis 60&10 %
Wrought Iron Flush, Stanley's ... dis 15&10 %
" " " Sargent's ... dis 50&10&10 %
Carriage and Tire, Common ... dis 75 %
" " " Norway Iron ... dis 50&10 %
" " " R. B. & W ... (old list) dis 60 %
" " " Philadelphia ... dis 60&5 %
" " " Shelton's ... (old list) dis 60&10 %
Union Nut Company, old list ... dis 65&5 %
Stove ... dis 25 %
" R. B. & W ... dis 25 %
" Shelton's Shaved Head ... dis 25 %
Borax ... 15c. ₩ lb
Boring Machines. Upright. Angular.
Hovey's, no Augers ... $3·15 $4·00 net
" with Augers ... 5·00 6·00 net
Douglass', no Augers ... 3·25 4·00 net
" with Augers ... 5·00 6·00 net
Parr's, no Augers ... 5·00 7·50 dis 30 %
" with Augers ... 7·50 10·00 dis 30 %
Kellogg's, no Augers ... 5·25 6·75 dis 15 %
Sweets' " ... 3·25 4·00 net
" with Augers ... 5·00 6 00 net
Snell's, " ... 4·75 6·25 dis 20 %
Phillips', with Augers ... 10·00 dis 25 %
Mortising Machines, $20·00 each ... dis 20 %
Bow Pins.
Union Nut Co ... new list dis 50&10&5 %
Hotchkiss' ... dis 50 @ 55 %
Humason, Beckley & Co.'s ... dis 50&10&5 %
Sargent & Co.'s ... dis 50&10&10 %
Braces.
Barber's Patent ... dis 40&5 %
Q. S. Backus ... dis 40&10 %
Wilson Mfg. Co ... dis 10 %
Spofford's Patent ... dis 50 %
Noble's Patent ... dis 40&5 %
Ives' Novelty ... dis 40&7½&10 %
" Hamden ... dis 15&10 %
Common Ball (American) ... dis 25 %
Brackets.—Shelf ... dis 60&10 @ 65&10 %
Bright Wire Goods ... dis 65&10&10 %
Bull Rings.—Union Nut Co ... dis 50&20 %
Sargent's ... dis 60&10 %
Hotchkiss' ... 2½ in., $2·25 net
Bung Hole Borers.
Common and Ring ... dis 20&10 %
Ives' Tap Borers ... dis 10&10 @ 25 %
Enterprise Mfg. Co ... dis 20 %
Butchers' Cleavers.
Humason & Beckley Mfg. Co ... dis 20&10 %
Bradley's ... dis 25 %
Beatty's ... dis 20 %
2 3 4 5 6 7 8 8
$19·00 $21·50 $24·00 $27·00 $30·00 $33·50 $36·50 $40·00
Hart Mfg. Co ... dis 45&10 %
0 1 2 3 4 5 6
$25·25 $29·75 $34·25 $38·75 $43·25 $48·50 $54·00
Butts.
Wrought Brass ... dis 30 %
Cast Brass ... dis 20 %
COMMON CAST, NOT DRILLED.
Fast Joint, Narrow ... New list July dis 30&10 %
" Broad " dis 40&10 %
" Jap'd " dis 35&10 %
Loose Joint, Narrow and Broad " dis 50&10 %
" " Jap'd " dis 45&10 %
Parliament Butts & Mayer's Hinges " dis 4 &10 %
Loose Pin " dis 45&10 %
" Japanned " dis 55&10 %
Loose Pin, Jap'd, Plated Tips " dis 50&10 %
Drilled and Wired.
Fast Joint, Narrow ... New list July 1, dis 25&10 %
" Broad " dis 35&10 %
" " Japanned " dis 30&10 %

Loose Joint ... new list July 1, dis 45&10 %
" Japanned " dis 45&10 %
Parliament & Mayer's Hinges " dis 35&10 %
Loose Pin " dis 40&10 %
" Japanned " dis 50&10 %
" " Plated Tips " dis 45&10 %
Union Mfg. Co.'s Fancy Butts.—
Figured Enameled Loose Joint ... dis 55&10 %
Nickel Plated " ... dis 33⅓&10 %
Boston Finish, Plain ... dis 30&5 %
" " with Iron Acorns ... dis 75&5 %
" " with Sil'd " ... dis 65&5 %
WROUGHT IRON.
Fast Joint, Narrow, Lt. and Regular ... dis 30&5
" Broad ... dis 35&5
Loose Joint, Broad ... dis 40&5
Table Butts, Back Flaps, &c ... dis 3 &5
Inside Blind, Regular ... dis 30&5
" " Light ... dis 40&5
Loose Pin, Wrt ... dis 35&5
Am. Spiral Spring Butt Co., list May 1st ... dis 25 %
Union Spring Hinge Co ... dis 20 %
Blind Butts, Parker ... dis 65&10 %
" Palmer ... dis 40 %
" Seymour ... dis 60&5 %
" Shepard ... dis 60 @ 60&10 %
" Lull & Porter ... dis 60 %
" Nicholson ... dis 45&10 %
" Huffer ... dis 33⅓&10 %
" Garretson, No. 1 ... dis 66 %
" Clark's, Nos. 1, 3 and 5 ... dis 65&10 %
" Clark's No. 2 ... dis 70&10 %
" " Nos. 2, 4, 1½, 6, 8, 10 ... dis 45 %
Can Opener.
Messenger's Comet ... per doz $3·00 dis 20 %
American ... per doz 2·25 dis 40 %
Lyman's ... per doz 3·75 dis 20 %
No. 4, French ... per doz 2·25 dis 40 %
No. 5, Iron Handle ... per doz 2·25 dis 40 %
Sprague's ... Nos. 1 2 3 4
Per doz $4·00 4·50 5·00 9·00 dis 45&10 %
Star ... per doz $5·00 dis 20&10 %
Eureka ... per doz $3·50 net
Sardine Scissors ... per doz $7·00 dis 40 %
Caps—Percussion, per 1000.
G. D ... 37 @ 40c
Ely's E. B ... 1-4s. 55c.; 1-10s. 70c. gold
" Double Waterproof, 1-4s, $1·45; 1-10s, $1·52½c., gold
Colt's ... 1-10s 80c gold
Carpet Sweepers.
Union ... each $2 75 net
Welcome ... each 2 75 net
Cartridges.—Metallic ... dis 55&5 %
Cards.—Horse and Curry ... dis 30&10 %
Cotton ... dis 10&10 %
Wool ... dis 15&10 %
Carpet Stretchers.
Cast Steel, Polished ... per doz $5·00 dis 30 %
Cast Iron, Steel Points ... per doz $2·00 dis 45&5 %
Casters.
Bed ... dis 30&10 @ 40 %
Plate and Shallow Socket ... dis 40&10 %
Deep Socket ... dis 35 @ 40 %
Cattle Leaders ... new list dis 60&10 %
Chain.
English Coil ... net gold
₩ lb ... 11¾ 8⅝ 7⅛ 7⅛ 7⅛ 7c
3-16 ¼ 5-16 ⅜ 7-16 ½
Trace, 6½-10-2 ... by the cask, ₩ pair, gold 55c
Trace, 7-10-2 ... by the cask, ₩ pair, gold. 62c
German Halter Chain ... dis 20 @ 25 % gold
German Coil ... dis 20 @ 25 % gold
Galvanized Pump Chain ... ₩ lb 18c
Jack Chain, Iron ... dis 50&10 %
" Brass ... dis 40&10 %
Chalk.
White ... ₩ gross, 57c net
Red ... ₩ gross, 90c net
Blue ... ₩ gross, $1·00 net
White Crayons ... ₩ gross, 16½c net
Chisels.
Socket Framing, Douglass, Extra ... dis 60&10&10 %
" " Crossman ... dis 50&15&10 %
" " Buck Bros. equivalent to dis 50&17½ %
" " Hart Mfg. Co ... dis 60&10 %
" " Merrill ... dis 60&10 %
" Firmers, Douglass, Extra ... dis 50&10&10 %
" " Crossman ... dis 50&15 %
" " Buck Bros ... equivalent to dis 50&15 %
" " Hart Mfg. Co ... dis 60&5 %
" " Merrill ... dis 60 %
Socket Corner ... dis 60&10 %
Tanged Firmers ... dis 40&10 %
" " Butcher's ... $5·50 to £ gold
" " Newbould's ... $5·50 to £ gold
" " Spear & Jackson's ... $5·00 to £ gold
" " Buck Bros (Shank) ... $5·50 to £ gold
Clamps.
Iron, Providence Tool Co.'s ... dis 20 %
" Adjustable, Gray's ... dis 20 %
" " Lambert's ... dis 20 %
" " Snow's ... dis 40&5 %
" " Hammer's ... dis 10 %
" Cabinet ... dis 60&10 %
Saw Clamps ... see vises
Clips, Axle.
Norway or Best ... dis 30 @ 40 %
Superior ... dis 50 @ 55 %
Coal Shovels.
Wrought Iron. Nos. 1 2
Long Wrt. H'dles .. per gross, $15·00 18·00 dis 25 %
Short " " " 12·00 14·00 dis 25 %
Wood Handles " 12·00 14·00 dis 25 %
Gem (Edgar's Pat.) " 15·00 18·00 dis 25 @ 30 %
Cast Iron, Iron Handle ... per doz, 75 @ 80c. net
" Wood Handle ... per doz, $1·00 net
Coal Hods.
Inch. 14 15 16 17 18
Regular, Jap'd ... per doz, $12·00 12·75 13·50 15·50 18·00 dis 60&10 %
Regular, Gal'd " 15·00 16·00 17·50 19·50 22·50 dis 50&10 %
Ladies' Favorite, Jap'd ₩ doz 15·00 16·00 18·00 20·00 dis 50 %
Ladies' Favorite, Galvanized " 19·00 20·00 22·00 25·00 dis 45 %
Funnel Hods.— Nos. 15 16 17
Oriental, Japanned ₩ doz. $16·50 18·00 20·00 dis 50 %
" Galvanized " 21·50 22·50 24·00 dis 40 %
Morning Glory, Jap'd " 16·50 18·00 20·00 dis 50 %
" " Gal'd " 21·00 22·50 24·00 dis 40 %
Iron Clad, Jap'd " 21·50 dis 60&10 %
" " Gal'd " 22·50 dis 50&10 %
Sidney Shepard & Co.'s new list ... dis 10 %
Cockeyes ... 1¼ in., 28c.; 1⅜ in., 33c.; 1½ in., 3 c. net
Cocks.
Brass Racking ... dis 30&10 %
Lock and Globe ... dis 30&10 %
Lever Bibbs ... dis 30&10 %
Ale and Beer ... dis 25&10 %
Coffee Mills.
Board and Box ... dis 15 @ 20 %
Brighton ... dis 20 %
Increase Wilson's ... dis 20 %
Selsor's Pat ... $9·50, $10·50—dis 25 %
American (Enterprise Mfg. Co.) ... dis 20 %
French Steel ... dis 20 %
The Swift ... dis 20 %
Compasses and Dividers.
Bemis & Call Co.'s ... dis 35&10 %
Cook's ... dis 15 %
Excelsior ... dis 40 %
Peck Stow & Wilcox ... dis 25 %
Miller's Patent ... dis 25&10 %
Coopers' Tools.
Bradley's ... dis 15 @ 20 %
Chas. E. Little ... dis 20 @ 25 %
Swan & Brombacher ... dis 15 @ 20 %
Corkscrews ... dis 25 %
Corn Knives and Cutters.
Bradley's ... dis 10 %
Crow Bars.
Cast Steel ... ₩ lb 11c. net
Iron, steel points ... ₩ lb 5c
Crucibles.—Gautier & Co ... ₩ No. 5½c
Curling Irons, &c.
⅛, ⅜, ½ in., $1·80, $2·00, $2·40 ... dis 10 %
Curling Tongs ... ₩ doz $6 50—dis 15 %
Pinching Irons ... ₩ doz 7 50—dis 20 %
Curry Combs.
Hotchkiss' & Kellogg's, Iron & Brass, old list ... dis 40 %
Fitch's (List of No. 240, $1) ... dis 20&10 %
Rubber ... ₩ doz, $9·00—dis 15 %
Wood Tooth (Fuller Bros.) ... per doz $2·25 net
Curtain Pins.—Silvered Glass ... new list dis 15 %
Cutlery.
American Table { Meriden } New list Jan. '75, dis 25 %
American Pocket { Cutlery Co } ... dis 25 %
Am. Pocket—Humason & Beckley Mfg. Co ... dis 20&10 %
Am. Miller Bro.'s Cutlery Co ... dis 25 %
Naugatuck Cutlery Co ... dis 25 %
Dippers.
Britannia ... per doz 7·50—dis 30 %; by bbl. dis 33⅓ %
Cocoa, Plain ... per doz $3·25—dis 20 %
" Rimmed ... per doz 3·75—dis 20 %
Dog Collars.
Embossed Gilt ... dis 20 %
Leather ... dis 30 %
Brass ... dis 25 %
Door Springs.
Gem (V.W.&W.), No. 1 Large, Jap'd ... ₩ doz $3·50 } dis 10 %
" " No. 2 Medium ... ₩ doz 2·50
" " No. 3 Small ... ₩ doz 2·00 }
Gray's (V.W.&W.) ... ₩ doz 2·50 net
Torrey's Pattern (V.W.&W.) ... ₩ doz $2·50 net
Torrey's Patent ... ₩ doz $2·50 net
Johnson's ... per doz $3 00 net
Philadelphia ... 5 in., $5·00 8 in., $7·00 dis 15 %
Palmer's Japanned No. 6 ... ₩ doz $5·00 }
" Coppered " ... 6·00 } dis 20 %
" Silvered " ... 8·00 }
Challenge— Nos. 9 7 6
Japanned ... per doz $2·00 2·50 3·50 }
Coppered ... per doz 4·00 4·50 5·00 } dis 10 %
Galvanized ... per doz 3·50 4·00 4·50 }
Nickeled ... per doz 5·50 6·00 7·00 }
Barker's Concealed ... dis 12½ %
Drawing Knives.
Crossman's No. 1 ... dis 50&15&10 %
Douglass, Extra ... dis 60&10&10 %
Hart Mfg. Co., No. 1 ... dis 60 %
Merrill ... dis 60&10 %
Nobles Mfg. Co ... dis 15 %
Bradley's ... dis 25 %
Adjustable Handle ... dis 15 %
Drills and Drill Stocks.
Blacksmiths' ... each $2 60 net
" Self-Feeding ... each $8 00 net
Breast, P. S. & W ... dis 45 %
" Aiken's ... dis 25&10 %
" Hotchkiss ... dis 10 %
" Wilson's ... dis 10 %
" Miller's Falls ... dis 25 %

Ratchet, Merrill's ... dis 20 %
" Ingersoll's (old list) ... dis 35 %
" Whitney's ... dis 20 %
Ratchet, Weston's ... dis 20 %
" Moore's Triple Action ... dis 20 @ 25 %
Wilson's Drill Stocks ... dis 10 %
Automatic Boring Tools ... each $2·75—dis 20 %
Drill Chucks.—The Danbury .. each 10·00, dis 20 @ 25 %
Beach Patent (Morse) ... dis 15 %
Egg Beaters.
Monroe's ... 8 in. 10 in.
Per doz $8·00 9·00 ... dis 10 %
Dover ... ₩ doz $6·00—dis 10 %
National ... ₩ doz $4·50—dis 20 %
Peerless ... ₩ doz $3·00—net
Emery.
Genuine Chester—Regular Nos ... ₩ lb 6c } dis 10 %
" Flour and FF ... ₩ lb 4c }
Washington Mills—Regular Nos ... ₩ lb 8c
" Flour ... ₩ lb 5c
Wellington Mills, Grain ... ₩ lb 10c. net
" " Flour ... ₩ lb 8c. net
Enameled and Tinned Ware.
Kettles ... dis 30 @ 40 %
Sauce Pans ... dis 25 %
Glue Kettles ... dis 25 %
Tinned Saucepans ... dis 25 %
Escutcheons.
Door Lock ... Same discounts as Door Locks
Brass Thread ... dis 60&10 %
Wood ... dis 25 %
Faucets.
Fenn's ... dis 50 %
" Cork Stops ... dis 40 %
Star ... dis 55&10 %
Frary's Patent Petroleum ... dis 15&10 %
Taylor's Pattern " ... dis 20&10 %
Wood and Metallic ... dis 40 %
Wood, Cork Lined ... dis 65 @ 65&5 %
Enterprise Mfg. Co., Self-Measuring ... dis 20 %
Felloe Plates ... ₩ lb 15c; dis 25&10 %
Files.
American File Co ... $5 00 to £ currency—dis 20 %
Arcade File Works ... $5·00 to £ currency
Auburn File Works ... $5 00 to £ currency
Nicholson ... new list, Jan. 1, 1875, net @ 5 %
Hartford File Co ... $5 50 to £ currency—dis 10 %
L. B. Heller & Co ... $5 00 to £ currency
Heller & Bros ... $5 00 to £ currency
"Western" ... 5 00 to £ net
Wheeler, Clemson & Co ... $5 00 to £ currency
Rothery's ... $5 to £ currency
J. & Riley Carr ... 5 25 to £ gold
" " Horse Rasps ... 5 50 to £ gold
Stubs' ... 8 50 @ 9 00 to £ gold
Butcher's ... 5 25 to £ gold
Walter Spencer & Co.'s "Diamond" ... 5 00 to £ gold
Spear & Jackson's ... 5 00 to £ gold
Jowitt's ... 4 50 to £ gold
Newbould's ... 5 25 to £ gold
W. K. & C. Peace's "Imperial" ... 5 25 to £ gold
R. Ibbotson ... 5 00 to £ gold
Turton Bros. & Matthews ... $5 50 to £ currency
Fisher's ... 4 75 to £ gold
Goodlad's ... 4 00 to £ gold
Moss & Gamble ... 5 25 @ 5 50 to £ gold
Thos. Turner & Co. (Peter A. Frasse & Co.) 5 00 to £ gold
" " Horse Rasps ... 5 25 to £ gold
"Philo Sheffield," P. T. Co ... 5 00 to £ gold
Limet & Co. (French) ... 5 00 to £ gold
Fluting Machines.
Mrs. Coles' Pony .. 4 in., $4·75; 5 in., $5; 6 in., 5·50; 7 in., $6
Knox with 4-inch Rolls ... 3 80 each net
" " 6 " ... 4 30 each net
" " 8 " ... 6 75 each net
O. K ... 6 50 each net
Peerless, 4-inch Rolls ... 4 00 each net
" 5 " ... 4 75 each net
Excelsior, No. 1 ... 4 75 each net
" No. 2 ... 6 50 each net
Diamond ... 7 50 each net
Champion, 6 inch rolls ... 6 00 each net
" 4 inch rolls ... 5 00 each net
Climax 7-inch Rolls ... 8 00 each net
" 4½ " ... 6 50 each net
Empire ... 4 00 each net
Eureka, No. 1, 7-inch Roll ... 8 00 each net
" No. 2, 5-inch Roll ... 6 00 each net
Defiance ... 4 in., $3·50; 6 in., $4·00; 8 in., $6·50 each net
K. F. M., 4½-inch Roll ... 5 50 each dis 15 %
" 6-inch Roll ... 6 00 each dis 15 %
Myers' Fashion Fluter, 4½-inch Rolls ... 2 75 each net
" Convex Brass Fluter, Sad Iron attachment ... per doz $15·00
Domestic Fluter ... $1·50 each net
Geneva Hand Fluter ... $15 00 per doz net
Fluting Scissors ... dis 25&10 %
Forges.
"Empire" (W. P. Kellogg & Co.) ... dis 20 %
Forks.
Hay, Manure & Spading ... dis 33⅓ %
Plated A 1 ... dis 50 %
Fry Pans.
Burnished, P. S. & W., new list ... dis 50 %
₩ doz ... $3·00 3·75 4·25 4·75 5·25 6·00 7·00 8·00 9·00
No. ... 0 1 2 3 4 5 6 7 8
Smith, Burns & Co., "Excelsior" Polished ... dis 35 %
₩ doz ... $3·70 4·00 4·70 5·30 6·00 7·00 8·00 9·00
No. ... 1 2 3 5 6 7 8
Gas Stoves.
Tift & Howard ... dis 20 %
Gauges.
Marking ... dis 45&10 %
Wire ... dis 10 %
" Smith's Patent ... per doz $18·00, dis 40 %
Gimlets.
Nail and Spike ... dis 25&10 %
Double Cut, Shepardson's ... dis 20 %
" " Hartwell's ... dis 40 %
" " Ives' ... dis 25 %
" " Douglass' ... dis 20&10 %
Glue Pots.
Tinned and Enameled ... dis 25 %
Family, Howe's "Eureka" ... dis 25 %
" L. E. & C.'s "Handy" ... dis 25 %
Grind Stone Fixtures
Sargent's Patent ... dis 65&10 %
Reading Hardware Co ... dis 70&10 %
J. F. Green & Bro ... dis 20 %
Hart Mfg. Co.'s ... dis 60&5&10 %
Rick Bros ... dis 45&5 %
Hammers.
Emmet Hammer Co.'s Handled ... dis 25 %
" " Sledge & Stone. ₩ lb 40c.; dis 40 %
Humason & Beckley Mfg. Co ... dis 16⅔&10 %
Maydole's ... dis 12 %
Henry Hammonds' (Maydole's List) ... dis 12 %
Cheney's ... net @ dis 5 %
Verree ... dis 5 %
Yerks & Plumb ... dis 20 %
Magnetic Tack ... dis 25&10 %
Warner & Noble's ... dis 10 %
Hand Cuffs and Leg Irons.
Tower's Hand Cuffs, $4 00 per pair } dis 35 %
" Leg Irons $6 50 per pair }
Providence Tool Co.'s Hand Cuffs . $15 per doz } dis 10 %
" " Leg Irons 25 " }
Handles.
Door or Thumb Latches—
Nos. 0 1 2 3 4
Per doz $·80 1·00 1·18 1·35 1·50—dis 60 %
Roggin's Latches ... 40c. @ 50c. net
Bronzed Iron Drop Latches ... per doz $1·50 net
Wrought Chest ... dis 60&10 %
Surface Chest ... dis 65&10&10 %
Flush Chest ... dis 60&10&10 %
Lifting ... dis 60&10 %
Coffin ... dis 50&10 @ 60&10 %
Saw and Plane ... dis 25&10 %
Hammer and Hatchet ... dis 10 %
N. Carolina Handle Co ... dis 15 %
Brad Awl ... per gross $3 50—dis 20&10 %
Hickory Firmer Chisel, ass'td " 5 25—dis 20&10 %
" " " large " 6 50—dis 20&10 %
Apple " " ass'td " 6 00—dis 20&10 %
" " " large " 7 50—dis 20&10 %
Socket " " ass'td " 3 50—dis 20&10 %
" Framing " " " 7 00—dis 20&10 %
File ... " " 4 00—dis 20&10 %
Auger ... " " 6 50—dis 20&10 %
" large " 8 00—dis 20&10 %
Patent Auger, Ives' ... dis 25&10 %
" " Douglass' ... per set $1 25—dis 10 %
" " Swan's ... per set $1 00—dis 30&10 %
Hangers.
Barn Door ... dis 65&10 %
"Anti-Friction" No. 1, $1·25; No. 2, $1·50 ₩ pr. dis 30&5 %
Novelty ... dis 30 %
Challenge ... dis 40 %
Harness Snaps.
Henshaw's ... dis 25&10 %
Judd's ... dis 40 %
Fitch's (Bristol) ... dis 30 %
Hotchkiss' ... dis 10 %
Andrews' ... dis 25 %
Sargent's ... dis 50&10 %
New York Wire ... dis 20&20 %
Hatchets.—Isaiah Blood ... dis 15 %
Shingling, Nos. 1 2 3 ... ₩ doz $7 25 8 00 8 75
Claw, " 1 2 3 ... ₩ doz 7 75 8 50 9 25
Lathing, " 1 2 3 ... ₩ doz 7 50 8 00 8 50
Hunt's ... dis 15 %
Shingling, Nos. 1 2 3 ... ₩ doz $7 25 8 00 8 75
Claw, " 1 2 3 ... ₩ doz 7 75 8 50 9 25
Lathing, " 1 2 3 ... ₩ doz 7 50 8 25 9 00
Hurd's ... dis 30 %
Shingling, Nos. 1 2 3 ... ₩ doz $8 00 8 50 9 00
Claw, " 1 2 3 ... ₩ doz 9 00 9 50 10 00
Lathing, " 1 2 3 ... ₩ doz 8 00 8 50 9 00
Newark's Edge Tool Co.'s ... dis 25 %
Shingling, Nos. 1 2 3 ... ₩ doz $6 50 7 00 7 50
Claw, " 1 2 3 ... ₩ doz 7 25 7 75 8 25
Lathing, " 1 2 3 ... ₩ doz 6 50 7 00 7 50
Yerkes & Plumb ... dis 20 %
Shingling, Nos. 1 2 3 ... ₩ doz $7 00 7 50 8 00
Claw, " 1 2 3 ... ₩ doz 7 50 8 00 8 50
Lathing, " 1 2 3 ... ₩ doz 7 00 7 50 8 00
Simmon's ... dis 15 %
Shingling, Nos. 0 1 2 3 ... ₩ doz $7 50 8 00 8 50 9 00
Claw, " 1 2 3 ... ₩ doz 9 00 9 50 10 00
Lathing, " 1 2 3 ... ₩ doz 8 00 8 50 9 00
Broad, " 1 2 3 ... ₩ doz 9 00 10 00 12 00
" " 4 5 6 ... ₩ doz 14 00 16 00 18 00
" " 7 8 ... ₩ doz 20 00 22 00
Elephant ... dis 30 %
Shingling, Nos. 1 2 3 ... ₩ doz $8 00 8 50 9 00
Claw, " 1 2 3 ... ₩ doz 9 00 9 50 10 00
Lathing, " 1 2 3 ... ₩ doz 8 00 8 50 9 00
J. P. Verree & Co ... dis 5 %
Shingling, Nos. 1 2 3 ... ₩ doz $7 00 7 50 8 00
Claw, " 1 2 3 ... ₩ doz 7 50 8 00 8 50
Lathing, " 1 2 3 ... ₩ doz 7 00 7 50 8 00
Underhill's ... dis 10 %
Shingling, Nos. 1 2 3 ... ₩ doz 7 25 8 00 8 75

Claw, " 1 2 3 ... ₩ doz 7 75 8 50 9 25
Lathing, " 1 2 3 ... ₩ doz 12 00 11 00 13 00
M. H. Jones & Co ... dis 25 %
Shingling, Nos. 1 2 3 ... ₩ doz $8 00 8 50 9 00
Claw, " 1 2 3 ... ₩ doz 9 00 9 50 10 00
Lathing, " 1 2 3 ... ₩ doz 8 00 8 50 9 00
Hay Knives.—"Lightning" ... per doz $20·00 net
Hinges.
Gate, Western ... ₩ doz $6·25—dis 60&10 %
" N. E ... ₩ doz 11·25—dis 60&10&10 %
" N. Y. State ... ₩ doz 7·20—dis 60&10 %
Rolled Plate ... dis 65&10 %
" Raised ... dis 65&10 %
Wrought Strap and T ... dis 50 @ 55 %
Providence Plate. { 6 and 8 in. 11c ₩ lb; over 8 in. 9½c ₩ lb } ... dis 30 %
Screw Hook and Strap ... { 8, 10, 12 in. 6½c; 14 to 36 in. 5½c } ... net
Heavy Welded Hook ... { 8 to 12 in. 6½c; 14 in. & up, 6c } ... net
Screw Hook and Eye ... { ⅜ to 1 in., 8½c; ⅝ in. 9½c; ½ in. 11½c } ... net
Hoes.
Solid Shank, C. S ... ₩ doz $8 00—dis 35 %
Socket ... ₩ doz 9 00—dis 35 %
Riveted Eye ... ₩ doz 5 00—dis 35 %
Grub ... dis 25 %
Planters ... net @ dis 5 %
" Scovill ... add 33⅓ %
" Scovill Pattern ... net @ dis 5 %
Lane's C. S. Cresent, American Pattern ... list net
" " Scovil Pattern ... add 10 %
Hooks.
Bird Cage ... dis 60&10 @ 70&10 %
Cotton ... dis 50 %
Belt ... dis 55 @ 60 %
Bench—Hotchkiss' $5 00 ₩ doz ... dis 10 %
" Weston's No. 1, $8·00; No. 2, $7·00 per doz net
" McGill's ... $3 00 per doz, dis 10 %
" Skinner's ... per doz $6·25, dis 20 %
Clothes Line, Harness, Wardrobe, Hat and Coat, Ceiling, } Hart's list ... dis 60&10&10 %; Sargent's list ... dis 60&5&10 %; Reading list ... dis 35&10 %
Wrought Staples and Hooks and Staples ... dis 70&10 %
Wire Screw Hooks and Eyes ... dis 65&10&10 %
Grass ... dis 20 %
Whiffletree—Patent ... dis 33⅓ %
Hooks and Eyes—Malleable Iron ... dis 60&10&10 %
" " Brass ... dis 60&10&10 %
Horse Nails.

Nos.		5	6	7	8	9	10
American Pressed	₩ lb	22c	20c	20c	20c	20c	20c
Ausable	"	30c	27c	25c	24c	2 c	22c
" P't'd & Pol'd	"	31c	28c	26c	25c	24c	23c
" " & Blued	"	32c	29c	27c	26c	25c	24c
Cortland	"	29c	26c	24c	23c	22c	21c
Buffalo Forged	"	31c	28c	26c	25c	24c	23c
Globe, P't'd & Pol'd	"	31c	28c	26c	25c	24c	23c
National, Pointed and Polished, Pat. Fin	"	29c	25c	23c	22c	21c	20c
National, Pointed and Polished, Ex. Fin	"	30c	27c	25c	24c	23c	22c
Perkins' Pointed and Polished	"	30c	27c	25c	24c	23c	21c
Perkins' Pointed and Blued	"	31c	28c	26c	25c	24c	22c
Putnam	"	32c	28c	26c	25c	24c	23c
Vulcan, P't'd & Blued	"	33c	30c	28c	27c	26c	25c

Star Brand, 16c.; Morgan ... 14c
Putnam ... 3000 lbs., dis 5 %
Ausable, Am. Pressed, Perkins, Globe, National and New London ... 1000 lbs., dis 5 %
Vulcan ... 1000 lbs., dis 7½ %
Vulcan and Brundage ... 500 lbs., dis 5 %
Horse Shoes.
Burden ... ₩ keg, $5·12½
R. I. Horse Shoe Co., Perkins Pattern ... ₩ keg, 5·12½
" " R. I. Pattern ... ₩ keg, 5·87½
Mule Shoes ... ₩ keg, 6·12½
Perkins' Snow ... ₩ keg, 6·62½
Boston Rolling Mills Hand Made ... ₩ lb 8c
Kettles.
Brass ... ₩ lb 45c net
Enameled ... dis 30 @ 40 %
Knives.
Ames' Butcher Knives ... dis 20 %
" Shoe " ... dis 15 %
" Bread " ... ₩ doz $1·50—dis 15 %
Hay and Straw, "Wadsworth's" ... dis 20 %
Table and Pocket ... See Cutlery
Knobs.
Carriage (Jap'd 80 cents per gross) ... dis 60&10 %
Base—Common ... net
" Plush Tip ... dis 10 %
" Elastic End, No. 8 ... dis 45 @ 50 %
Door, Mineral ... ₩ doz $2·25 }
" Por. Jap'd ... ₩ doz 3·00 } ... dis 40&5 %
" " Plated ... ₩ doz 7·00 } & 2 % for cash
" " Por ... ₩ doz 7·50 }
Furniture, Plain ... 75c gross inch, dis 10 %
Ladles.
Melting, Hart's ... dis 55&10 %
" Sargent's ... dis 50&10 %
" Reading ... dis 15&10 %
" Monroe's Patent ... per doz $4·00 dis 20 %
Lanterns.
Tubular ... No. 0, $11·00; No. 1, $14·00 net
Peerless ... No. 5, per doz $11·75—dis 10&10 %
Brady's Patent ... dis 10 & 10 %
Ætna ... dis 10 & 10 %
Yankee ... dis 10 & 10 %
De Beque ... dis 10 & 10 %
Police, Small ... per doz $7·50 net
Lard Presses.
Draw Cut, 14 inch ... each $65 00—dis 20 %
Lemon Squeezers.
Porcelain Lined ... per doz $7 00, dis 15 %
Eureka, Tinned ... per doz, $10·00 dis 10 %
Dunlap's Improved ... per doz $6 00 net
Lines.
Linen Fish ... dis 20 %
Cotton Chalk ... dis 40 @ 45 %
Sil. Lake Chalk ... Nos. 0, 1, 2, 3, $6, 6·50, 7, 7·50, dis 20 %
Mason's ... dis 20 %
Locks and Latches.
Cabinet—Gaylord ... dis 25 %
" Eagle ... dis 25 %
Trunk ... dis 25 %
Langstroth & Crane, Round Key ... dis 40 %
" " Flat Key ... dis 33⅓ %
Barnes & Deitz, Flat Key ... dis 25 %
Yale Lock Co., Flat Key ... dis 40 %
Sargent & Greenleaf, Flat Key ... dis 20 %
Continental ... dis 25 %
Shepardson's ... dis 20 %
American Lock Co ... dis 33⅓ %
Plate ... new list dis 40&2 %
Trenton / Branford / Norwich / Russell & Erwin / Norwalk / Nashua / Mallory, Wheeler & Co / P. & F. Corbin / Parker & Whipple / Jacobus & Nimick Mfg. Co } ... dis 40&5 % ... and 2 % for cash
Padlocks, Russell & Erwin / Mallory, Wheeler & Co / Wm. Wilcox & Co } ... dis 40&5 % ... and 2 % for cash
" Romer's ... dis 5 %
" Vulcan Hardware Co ... dis 20 %
" New York Lock Co ... dis 20 %
" J. H. McWilliams ... dis 5 %
" Barnes & Deitz ... dis 25 %
" D. K. Miller Lock Co ... dis 30&10 %
" Penn Lock Works ... dis 20 %
Mallets.—Hickory and Lignumvitæ ... dis 20 %
Meat Cutters.
Dixon's (P. S. & W.) Nos. 1 2 3 4
₩ doz. $14 00 $17 00 $19 00 $30 00 dis 25 %
Miles Challenge ... Nos 1 2 3
₩ doz. $22·00 $30·00 $40 00—dis 30 %
Perry's (P. S. & W.) ... Nos. 200 300 400
₩ doz. $22·00 $27·00 $40·00—dis 25 %
Woodruff's (P. S. & W.) ... Nos. 100 150
₩ doz. $15·00 $15·00—dis 25 %
Hales' ... Nos. 11 12 13
₩ doz. $27·00 $33·00 $42·00—dis 35&2 %
Draw Cut ... Nos. 5 6 7
Each $56·00 $90·00 $250 00—dis 20 %
American ... dis 25 @ 25&5 %
No. 1 2 2½ 3 4 B 5
Each ... $6·00 $9·00 $12·00 $15·00 $30·00 $60·00 $75·00
Molasses Gates.
Stebbins' ... dis 62½&10 %
" Tinned ends ... dis 40&10 %
Bush's ... dis 20 %
Lincoln's ... dis 50&10 %
Weed's ... dis 15 %
Mortars and Pestles.
Iron ... net
Nail Pullers.
Taft's ... per doz $24·00 net
Nails ... 10d., $3·00 @ $3·10 net
Nuts and Washers.
Nuts ... large, 7c; small, 10c off list.
Washers ... large, 9c; small, 12c off list.
Oilers.
Miller's Zinc, Brass and Copper ... dis 40 %
Sheet Metal Screw, Zinc, Brass and Copper ... dis 40 %
Olmsted's ... dis 25&10 %
Broughton's ... dis 25&10 %
Malleable ... per doz $5 00 dis 10 %
Prior's Patent or "Paragon" ... dis 40 %
Ox Shoes.
Concave ... ₩ lb 13c net
Ox Balls ... dis 60&10 %
Pencils
Faber's Carpenters' ... net
" Round Gilt ... ₩ gross $6 00 net
Dixon's Lead ... ₩ gross $4·50 net
" Lumber ... ₩ gross 9·00 net
Picture Nails and Knobs.
Brass Head ... dis 60&10 %
Porcelain Head ... dis 55&10 %
Richards' Patent ... dis 40 @ 40&10 %
Judd's ... dis 60&10 %
Pinking Irons ... per doz $2 75—dis 65 %
Planes and Plane Irons.
First Quality ... dis 35 %
Second Quality ... dis 50 %
Bailey's Patent Adjustable ... dis 25&10 %
Plane Irons, Butcher's ... $5 50 to £ gold—new list
" Buck Bros ... $5 50 to £ gold
" Bailey's Patent ... dis 25&10 %
" Auburn Tool Co.'s ... dis 25 %
" Greenfield Tool Co ... net list
" Middletown Tool Co ... net list
" Ohio Tool Co ... dis 10 %
" Spear & Jackson's ... 5 00 to £ gold

Plane Irons, Sandusky Tool Co ... dis 10 %
Plow Bits, Greenfield Tool Co ... dis 10 %
Pliers and Nippers.
Button's Patent ... dis 33⅓ %
Hull's Patent Nippers .. No. 1, $15; No. 2, $21 ₩ doz dis 25 %
Leach's Patent Wire Cutters ... per doz $6 50—dis 15 %
Gas Pliers ... dis 25 %
Plumbs and Levels
Stanley R. & L. Co.'s Pat. Adjustable ... dis 65&10 %
" " " Non-Adjustable ... dis 65&10 %
Chapin's ... dis 66⅔&10 %
Standard Rule Co.'s New Adjustable ... dis 60&10
Standard Rule Co.'s Non-Adjustable ... dis 60&10&10 %
Pocket Levels ... dis 50&10 %
Johnson's Patent Adjustable ... dis 60&10 %
Davis' Patent ... dis 65&10 %
Pulleys.
Judd's Axle ... per doz $0·75 dis 40 %
Hot House and Tackle ... dis 60&10 %
Jap'd Screw ... dis 60&10 %
Brass Screw ... dis 60&10 %
Jap'd Side ... dis 60&10 %
" Clothes Line ... dis 60&10 %
Hay Fork ... per doz $4 50 @ 5 00, dis 10 %
Pumps.
Douglas Cistern, etc ... new list dis 25 %
" S. & F ... new list dis 20 %
Union Mfg. Co.'s Cistern and Pitcher ... dis 25 %
" " " Rams ... dis 20 %
" " " Garden Engines ... dis 10 %
Cucumber (Burlingham & Purdy)—
6 ft. No. 8, with 12 ft. pipe ... $4·00 net
ft. No. 1, with 12 ft. pipe ... 4·50 net
From 6 to 36 ft. add 20 cents per ft.
Pipe, 8c. per ft.; Coupling, 20c. per ft.
Punches.
Belt or Drive ... per doz $1·50 net
Spring ... per doz $6·50—dis 20&10 %
" Leach's Patent ... dis 15 %
Rail.
Sliding Door, Wrought Brass ... ₩ lb 44c., dis 10 %
" " Iron, Painted ... ₩ foot 9c—dis 55&10 %
Barn Door, ½, ⅝ and ¾ inch ... dis 60&10&10 %
" " for N. E. Hangers ... dis 60&10&10 %
Rakes.
Cast Steel ... dis 35 %
$8 00 9 00 10 00 11 00
8 10 12 14 teeth.
Malleable ... dis 35 %
$5 00 5 50 6 00 6 50
9 11 13 15 teeth.
Razor Straps.
Evan's ... dis 40 %
Imitation Emerson ... ₩ doz $2·75—dis 40 %
Hunt's ... dis 40 %
Chapman ... dis 10 @ 15 %
Torrey's ... dis 10&10 %
Saunder's ... net @ 10 %
Rivets.—Old Colony.
Iron and Tinned ... dis 55 %
In bulk ... dis 40 %
Copper Rivets and Burrs ... dis 20 %
Nos. 7 8 9 10 11 12 13 14 15
Per lb. 49c 50c 52c 54c 56c 58c 60c 65c 70c
Rivet Sets ... dis 10 %
Rods.
Stair ... dis 40 %
" American Patent ... dis 33⅓ %
Rollers.
Barn Door ... revised list dis 60, 10&10 %
Novelty ... dis 10 %
Rope. Manufacturers' List of Sept. 28, 1875.
Manila ... ½ inch and larger ₩ lb 14½c
" ... ⅜ inch ₩ lb 15 c
" ... ¼ and 5-16 inch ₩ lb 15½c
Manila Lath Yarn and Tar'd Rope ... ₩ lb 14 c
" Hay Rope ... ₩ lb 15 c
Sisal ... ½ inch and larger ₩ lb 11½c
" ... ⅜ inch ₩ lb 12 c
Sisal ... ¼ and 5-16 inch ₩ lb 12½c
" Hay Rope ... ₩ lb 12 c
Rules.

	Boxwood.	Ivory.
Chapin's	dis 60&10 %	dis 50&10 %
Stanley	dis 60&10 %	dis 50&10 %
Standard	dis 60&10 %	dis 50&10 %
Stephens'	dis 60&10 %	dis 50&10 %
Willis Thrall & Son	dis 60&10 %	dis 50&10 %

Sad Irons.
From 4 to 10 lbs ... ₩ lb 3¾ @ 3⅞c net
Sad Iron, Nickel Stand attached ... ₩ lb 9c
Self-Heating ... per doz $10 00 net
" " Tailors' ... per doz 22 50 net
Sand Paper.
Beader & Adamson's Flint, 00 to 1½ ... $4 25 ₩ ream }
" " " 2, 2½ & 3. 4 75 " } dis 15 %
" " " Assorted. 4 25 " }
" " Star ... ₩ ream $3 25 }
" " Emery ... ₩ ream $6 50 @ 11 50 }
New England, same list as B. & A. Flint ... dis 15 %
H. B. & H. Roman Flint " ... dis 15 %
Sash Cord.
Common ... ₩ lb 18 @ 20c. net
Patent ... ₩ lb 24c. net
Silver Lake, Russia Flax ... ₩ lb 55c }
" " White Cotton ... ₩ lb 55c } net
" " Drab Cotton ... ₩ lb 60c }
Raw Hide ... dis 15 %
Sash Locks.
Clark's, Nos. 1 and 2, $10·00 per gross ... dis 33⅓ %
Ferguson's ... dis 33⅓ %
Norwich ... dis 25 %
Walker's ... dis 10 %
New England ... dis 20 %
Sash Weights.—Solid Eyes ... ₩ lb 2c
Sausage Stuffers or Fillers.
Miles ... ₩ doz $20—dis 30 %
Stow or Perry ... ₩ doz No. 1, $15; No. 0, $21—dis 25 %
Draw Cut No. 4 ... each $80 00—dis 20 %
Saw Frames ... per gross $18 00—dis 15&10 %
Saw Rods ... $10 list, dis 10&10 %
Saws.
Spear & Jackson's ... $3 50 to £ gold
Am. Saw Co ... new list
Perforated Cross Cuts, all kinds ... 68c ₩ foot
Inserted Tooth ... dis 10 %
All else ... dis 12½ %
Disston's Circular ... dis 20 %
" Mill ... dis 25 %
" Cross Cut ... dis 15 %
" other kinds ... dis 12½ %
H. W. Peace's Circulars ... dis 25 %
" Other kinds ... dis 20 %
Wm. McNiece's Hand, Cross Cut and Circular ... new list dis 15 %
Wm. McNeice's Patent Pole Pruning Saw ... dis 10 %
" " Compass Saw ... net.
E. M. Boynton's Lightning ... dis 50 %
" " One-Man, all lengths ... dis 40&5 %
" " Buck Saws (Cross Bar) ... per doz $8·50
" " Billet Webs ... per doz 6·00
Wheeler & Clemson Mfg. Co.'s Hand ... dis 15 %
" " " Cross-Cut ... dis 30 %
Livingston's Butcher and Kitchen ... dis 15 %
Livingston's Framed Wood—
Nos. 101 102 103 104 105 106
Per doz $12·00 10·00 12·00 9·00 8·00 6·00 dis 10 %
Saw Sets.
Stillman's Genuine ... ₩ doz $5·00—dis 10 %
" Imitation ... ₩ doz 3·25—dis 20 %
Common Lever ... per doz $2·00 dis 20 %
Leach's ... No. 0, $8·00; No. 1, $15·00 dis 15 %
Nash's ... No. 1, $8·50; No. 2, $5·50 dis 20&10 %
Hammer, Hotchkiss ... $5·50 dis 10 %
" Bemis & Call's ... dis 20 %
" Aiken's Genuine ... $14·80 dis 40 %
" " Imitation ... $7·00 dis 25&10 %
Boynton's ... per doz $12·00 dis 30 %
Scales.
Hatch, Counter ... ₩ doz $36—dis 25 %
" Tea ... ₩ doz $15—dis 25 @ 30 %
Union Platform ... $6·00, $7·00—dis 40 %
Turnbull's ... dis 15 @ 20 %
Brown's ... dis 25&5 %
Fairbanks' ... new list dis 15 @ 20 %
Howe's ... dis 15&5 %
Chatillon's Grocers' ... dis 25 %
" Eureka ... dis 20 %
Universal Family ... dis 25 %
Scale Beams.
No. 1 300 to 1200 lbs ... 90c ₩ cwt } dis .. 35 @ 40 %
No. 2 " " ... 75c ₩ cwt }
Scrapers.
Box, 1 Handle ... per doz $5·00, dis 10 %
" 2 " ... per doz 6·00, dis 10 %
Foot ... dis 60 & 10 %
Ship (common) ... per doz $3 00 net
Ship—Providence Tool Co ... dis 10 %
Screw Drivers.
Hart, Bliven & Mead ... dis 55&10 %
Douglass Mfg. Co ... dis 25&10 %
" " No. 1 ... dis 20&10 %
Disston's ... dis 40&10 %
Screws.
Flat Head Iron, List of September 1, 1875 ... dis 40 %
Round Head Iron " " " ... dis 30 %
Flat Head Brass " " " ... dis 40 %
Round Head Brass " " " ... dis 30 %
Round Head Silver Capped, List March 1 ... dis 40 %
Hand Rail ... dis 55&10 %
Coach or Lag ... dis 30&10 @ 40 %
Coach, Patent Gimlet Point, List Jan. 1, 1875 ... dis 35 %
Bed ... list net
Japanned, List of Sept. 1, 1875 ... dis 15 %
Machine—Flat Head, Iron, List Jan. 12, 1875 ... dis 25 %
" " Brass " " ... dis 15 %
" Round Head, Iron " " ... dis 20 %
" " Brass " " ... dis 10 %
English, Flat Head, Iron; American List, Sept. 1, 1875
Nettlefold & Chamberlain's ... dis 30&5 %
Birmingham Sc'w Co ... dis 30&5 %
Birmingham Screw Co., Brass ... dis 30&10 %
Bench—Iron ... dis 60, 10&10 %
" —Wood, Beach ... ₩ doz $3·00 net
" " Hickory ... dis 20&10 %
Hand ... dis 25&10 %
Jack—Bell Bottom ... dis 15 %
Scythes.
Blood's German Steel, Grass ... ₩ doz $10 00 }
" Cast " " ... ₩ doz 11 00
" Silver " " ... ₩ doz 12 00
" German " Grain ... ₩ doz 14 00 } dis $1·50 from list
" Cast " " ... ₩ doz 15 00
" Excelsior and Granger ... ₩ doz 11 00
" Young America ... 10 50
" Silver Clipper ... 13 00 }
Scythe Snaths ... dis 20 %
Sieves.—Mann's Patent ... dis 30 @ 35 %
14 16 18 20 24 30 mesh
Iron ... $4·00 4·00 4·25 4·50 4·75 6 50 ₩ doz
Plated. 4·75 5·00 5·25 5·50 5·75 8·50 "
Wood Rims ... 18 mesh, Small, $1·50 per doz, dis 10 %
" " Regular, 1·60 per doz, dis 10 %

Shears and Scissors.

Cast Steel....................dis 75&10 %
Cast Iron..........New list July 15..........dis 30 %
Heinisch Sons' Trimmers and Scissors..........dis 65 %
" " Standard quality Shears and Trimmers..........dis 40 %
Seymour's Straight Trimmers..........dis 60&10 %
" Scissors..........dis 50 %
Pruning..........per doz $10 00—dis 35 %
Barnard's Lamp Trimmers..........per doz $3 75

Sheaves.

Sliding Door, M. W. & Co. list..........dis 40&5&2 %
" R. & E. list..........dis 50&5&2 %
" Patent Roller..........dis 25 %
" " " Hatfield's..........dis 30 %
" Russell's Anti-Friction..........dis 50&2 %
Sliding Shutter, R & E. List..........dis 50&5&2 %

Shovels and Spades.

Ames..........dis 20 %
Birmingham Shovel Co..........dis 15 %
Rowland's..........dis 25 %
Old Colony..........new list dis 10&5 %
Middleboro' Shovel Co..........new list dis 20 %
C. E. Jennings & Co..........New list dis 30&10 %
Dunning's Shovels and Scoops..........dis 20&7½ %

Shovels and Tongs.

Iron and Brass Head, R. & E. list..........dis 50&10&2 %
" " Hart's..........dis 55&2&10 %
Polished Steel..........dis 50&10&2 %

Skates.

Barney & Berry's
- N. Y. Club..........℔ pair $2 75 } dis 25 %
- B. & B. Club.......... " 3 50
- All Clamp.......... " 4 25
- Rink.......... " 8 00

Florence Steel..........$1 00 dis 25 %
" Spring..........3 00 dis 30 %
" All Clamp..........3 50 dis 30 %
Peck & Snyder's— } dis...25 %
- No. 1, Blued..........per pair $5 00
- No. 2, Nickel Plated..........per pair 6 00
- No. 3, " " extra..per pair 8 00
- Clipper Club Blued..........per pair 3 50
- " " Full Pol'd....per pair 4 50
- " " " and Nickel Plated..........per pair 6 00

Acme Club Skates.—Nos. 5 7 10 12 14
Pair $4 00 5 00 7 00 7 50 8 00 dis 20 %

Slates.

Square Frames, Round Cornered, by case..........dis 65&10 %
Less than a case..........dis 65 %

Spoke Shaves.

Iron..........dis 33⅓&10 %
Wood..........dis 30 %
Bailey's..........dis 20&10 %

Spoke Shave Irons.

Spear & Jackson's..........$5 00 to £ gold

Spoons.

Tinned Iron..........dis 10 %
By the case..........dis 20 %
Basting..........dis 10 %
Britannia..........dis 50&5 @ 55 %
" Boardman's, new list..........dis 55 %
Rogers & Bro., A 1..........dis 50 %
Derby Silver Co..........dis 50 & 5 %
Holmes, Booth & Haydens..........dis 50 %
Nickel Silver Co..........dis 40 %
German Silver..........dis 30 @ 33⅓ %
Tin (P. S. & W.)—
Teas..........$1 50 ℔ gross, net
Tables..........2 75 " net

Stocks and Dies..........dis 5&10 %

Stone.

Hindostan Stone..........℔ ℔ 6c } dis 20&10 %
" Axe Stone..........℔ ℔ 8c
" Slips..........℔ ℔ 10c
Sand Stone..........℔ ℔ 6c—dis 20&10 %
Washita Stone..........No. 1, ℔ ℔ 30c net
" ....No. 2, ℔ ℔ 25c net
" Slips..........No. 1, ℔ ℔ 60c net
Arkansas Stone..........No. 1, ℔ ℔ $1 35 net
" Slips..........No. 1, ℔ ℔ $2 50 net
Grindstones, Family, J. F. Green & Bro..........dis 20 %
" " Loring's..........dis 10 %

Stove Polish.

Joseph Dixon's..........℔ gross, 6 00
Gem..........℔ gross $4 25 @ 4 50 net
Gold Medal..........℔ gross $6 00 dis 25 %
Rising Sun..........per gross $5 75 net

Squares.

Steel..........dis 50 %; full cases, dis 50&10 %
Iron..........dis 50 %; full cases, dis 50&10 %
Nickel Plated..........add $2 50 @ $4 00 ℔ doz net
Try Squares and T Bevels..........dis 45&10 %
Star Try Squares and Bevels..........dis 30 %
Disston's Try Squares No. 1..........dis 20 %
" " No. 2..........dis 40 %
" " Improved..........dis 20 %

Tacks.

Full Weight American Iron..........dis
Half Weight American Iron..........dis
Carpet..........dis
Brads American Half Weight..........dis
Finishing Nails.......⅜ ½ ¾ 1 1¼ in. and over
℔ ℔..........25c 20c 18c 14c 12c dis
Trunk and Clout.......⅜ ½ ¾ 1 1¼ in. and over
℔ ℔..........25c 20c 18c 14c 12c dis
Copper Tacks..........℔ ℔ 50c—dis
Iron Shoe Nails, ℔ ℔ 4-8 and longer, 9½c; 3½-8, 10c..........dis
Double Pointed..........dis 33⅓&10 %

Tapes, Measuring.

American Flask and Cap Co..........dis 20 %
Eddy's..........dis 20 %

Tea Trays.

American Tea Tray Co..........dis 15 %

Thermometers.

Tin Case..........dis 50&10 %

Toe Calks.

Winsted..........℔ ℔ 13c., dis 10 %

Tobacco Cutters.

Enterprise Mfg. Co. (Champion)..........dis 20 %
Wood Bottom..........per doz $12—dis 25&10 %
All Iron..........per doz $10 50—dis 25&10 %

Tinners' Tools and Machines.

P. S. & W..........dis 10 %

Traps.

Game, Newhouse..........dis 25 %
" Peck, Stow & Wilcox..........dis 30 %
" Hotchkiss.......old list dis 30 %; new list dis 10 %
" Blake's Patent..........dis 30 %
Mouse, Wood Choker..........℔ doz holes, 15 @ 16c
" Patent Chocker (Union Nut Co.)..........℔ doz holes 16 @ 18c net
" Round, Wire..........℔ doz $1 50 to 2 00 net
" Square, "..........℔ doz 2 00 to 2 50 net
" Cage, "..........℔ doz 2 50, dis 10 %
" Patent Self Setting..........per doz holes 25c net

Trowels.

Lothrop's Brick and Plastering..........dis 10 %
Disston's Brick and Plastering..........dis 12½ %
Rose's Brick..........dis 5 %
Brades' Brick..........gold, dis 10 %
Worrall's Brick and Plastering..........dis 20 %
Garden..........dis 25 %

Triers.

Butter and Cheese..........dis 25 %

Ventilators (Window).

Nickel and Gilt..........per dozen $16 00 @ 18 00

Vises.

Solid Box, Trenton...40 to 160 lbs., 16c.; 160 and over, 20c
" " Wilson's..........30 to 160 lbs., 18c } dis 25 %
160 and over, 22c
" " Peter Wrights..........16c gold
Parallel, Parker's..........dis 20 %
" Wilson's..........dis 30&10 %
" Sargent's..........dis 55&10 %
" Trenton..........dis 15 %
" Backus and Union..........dis 25 %
" Merrill's..........dis 15 %
" Fisher & Norris..........dis 15&10 %
" Buffalo..........dis 25 %
" Stevens'..........dis 15 @ 20 %
Saw Filers, Bonney's..........per doz $20 00 dis 20 %
" Stearn's..........per doz $20 00 dis 20 %
" Hopkins'..........per doz $17 50 dis 10 %

Wheel Barrows.

Canal (Pugsley & Chapman)..........new list dis 15 %
Coal, Garden and Stone (Pugsley & Chapman)....dis 25 %

Well Wheels.

Revised list..........dis 60&10 %

Wire.

Brass and Copper..........List of Oct. 27, 1875, net
Bright and Annealed..........Nos. 0 @ 18 dis 45 @ 50 %
" " .... 19 @ 26 dis 50 @ 55 %
" " .... " 27 @ 36 dis 55 @ 60 %
Coppered.......... " 0 @ 18 dis 40 @ 45 %
Galvanized, Nos. 0 to 9..........℔ ℔ 8 @ 8½c net
Galvanized, Nos. 10 to 18..........market list dis 15 @ 20 %
Tinned..........dis 25 @ 30 %
Cast Steel..........dis 15 @ 20 %
Tinned Broom Wire..........dis 35 @ 40 %
Galvanized Telegraph, Nos. 8 and 9..........℔ ℔ 9c
Galvanized Telegraph, Nos. 10 and 11..........℔ ℔ 10c
" " " 12..........℔ ℔ 10½c
Annealed Fence, Nos. 8 and 9..........dis 50 %
" Grape, " 10 to 14..........dis 50 %
Fence Staples..........℔ ℔ 7½ @ 8c
Stubs' Steel Wire..........$7 00 to £ gold
Judd's Picture Wire..........dis 50 %
Clothes Line Wire..........per coil 60c. net

Wrenches.

American Adjustable..........dis 45 %
Baxter's Adjustable "S"..........dis 20 %
" Diagonal..........dis 20 %
Collins & Co.'s..........dis 45 %
Coes' Genuine..........dis 40&10 %
" Pattern (Wrought)..........dis 50&10 %
" " (Malleable)..........dis 65&10 %
Diamond Hardware Co..........dis 40 %
Lindsay's Patent..........dis 25 %
Taft's Pattern..........dis 70&10 %
Davis Patent Duplex..........new list dis 25 %
Bemis & Call's Patent Combination..........dis 20&5 %
" " Merrick's Pattern..........dis 25&2½ %
" " Brigg's Patent..........dis 15&10 %
Aiken's Pocket (Bright)......per doz $10 00—dis 50&10 %

Wringers.

		Less than 2 doz	2 doz lots
Providence	℔ doz	$72 00	$70 00
Reliance	℔ doz	69 00	67 00
Universal—Extra	℔ doz	72 00	70 00
Novelty	℔ doz	72 00	70 00
Sherman	℔ doz	72 00	70 00
Eureka	℔ doz	60 00	58 00
Wringers without Cog Wheel	℔ doz	60 00	58 00

Stamped Tin Ware.

Common Stamped Ware..........dis 10 %
Stamped Deep and Retinned Ware..........dis 20&10 %
Japanned Tin Ware..........dis 5 %
Planished Tin Ware..........dis 20 %

METALS.

IRON.—Duty Bars, 1 to 1½ cents per lb., Sheet, Band, Hoop and Scroll, 1½ to 1¾ cents per lb. Provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 per ton; Polished Sheets, 3 cents per lb.; Wrought Scrap, $8 per ton; Cast Scrap, $6 per ton. Railroad, 70 cents per 100 lbs. Boiler and Plate, 1½ cents per lb.

Pig Iron—American.

Foundry No. 1..........℔ ton, $23 00 @
Foundry No. 2.......... " 21 00 @
Gray Forge.......... " 19 00 @ 20 00

SCOTCH.

Coltness.......... " 33 00
Glengarnock.......... " 31 00
Gartsherrie.......... " 32 50
Eglinton.......... " 29 50 @ 30 00
Summerlee.......... "

Bar Iron.

Am. Refined, at mill..........2·4c.

Rails.

American, at works, currency..........℔ ton 42 00 @ 46 00
Old Rails.......... " 22 50

Scrap.

Wrought Scrap.......... " 30 00

Bar Iron from Store.

Common Iron.
⅝ to 2 in. round and square.... } ℔ ton $57 50
to 6 in. x ⅝ to 1 in.......... }
Refined Iron.
⅝ to 2 in. round and square.... } " 57 50 @ 60 00
1 to 6 in. x ⅝ to 1 in.......... }
1 to 6 in. x ¼ and 3-16.......... " 62 50 @ 65 00
Shafting Iron—2¼ to 4 in.......... " 62 50 @ 75 50
Rods—3-16 to ⅝ round and square.. " 110 00 @ 65 00
Bands.......... " 70 00 @ 72 50
Hoops—⅝ to 2 in.......... " 130 00 @ 80 00
Swedish Iron.
Ordinary sizes.......... " 130 00 @ 132 50
Plow size.......... "

Sheet Iron.

		Common American and English.	R. G. American.	R. G. English.
Nos. 10 to 20	℔ ℔	3¾ @ 4c	5c	5½c
21 to 24	"	4c	5¼c	5¾c
25 to 26	"	4¼c	5½c	5¾c
27	"	4½c	5¾c	6c
28	"	4¾c		6¼c
Galvanized, 14 to 20, prime, ℔ ℔ 8¼c; 2d quality ℔ ℔ 7¾c				
21 to 24	"	" 9¼c	"	" 8¼c
25 to 26	"	" 10 c	"	" 9 c
27	"	" 10¾c	"	" 9¾c
28	"	" 11¼c	"	" 10¼c

Patent Polished..........℔ ℔ 14c
Russia, Nos. 8 to 16.......... " 15½c
" Stained, No. 1.......... " 14½c
Belgian..........10c
One piece Corrugated Sheet Iron Elbows.

CHARCOAL IRON.

⅝	5	5½	6	7 inch.
$2 50	3 50	4 50	5 25	6 50 per doz.

RUSSIA IRON.

4½	5	5½	6	7 inch.
$5 00	7 00	9 50	12 00	14 00 per doz.

COPPER—Duty. Pig, Bar and Ingot, 5c.; old copper, 4 cents ℔ ℔; Manufactured (including all articles of which copper is a component of chief value) 45 % ad valorem.
American Ingot..........℔ ℔ 23¼ @ 23½c
English..........

SHEATHING, BRAZIERS COPPER, BOLTS, &C.

Braziers Copper, ordinary sizes, over 16 oz., per square foot..........31c ℔ ℔
Braziers Copper, ordinary sizes, 16 oz. and over 12 oz., per square foot..........33c. "
Braziers'Copper, 12 oz. per square foot..........35c. "
Circles less than 84 inch in diameter..........34c ℔ ℔
Circles, 84 inch diameter and over..........37c. "
Segment and Pattern Sheets..........34c. "
Locomotive Fire Box Sheets..........31c. ℔ ℔
Sheathing Copper, over 12 oz. per sq. ft..........30c. "
" 12 oz. ℔ sq. ft. and lighter..........35c. "
Bolt Copper..........31c. "
Copper Bottoms, 33c. ℔ ℔..........net
No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

O'NEILL'S PATENT PLANISHED COPPER.

14x48.
14 and 16 oz. and heavier........37c. By the case, 36c. ℔ ℔
12 oz. and lighter..........40c. " " 39c. "
Boiler Sizes.
7 in., 14x52. 8 in., 14x56. 9 in., 14x60
14 and 16 oz. and heavier..........39c. By the case, 38c. ℔ ℔
(And all sizes not over 20 inches wide.)
30x60
14 and 16 oz. and heavier..........41c. ℔ ℔
12 oz..........44c. "

TINNING.

14x48, by the case..........8c. ℔ sheet
14x48, less than case..........10c. "
Other sizes not larger than 30x60..........2½c. ℔ sq.
Larger than 30x60..........5c. "

Brass.

Brown & Sharp's Gauge the Standard except for Fine Wire.

BRASS MANUFACTURERS' PRICE LIST.
October 27th, 1875.
Net cash prices for Roll and Sheet Brass, Wire, &c., for quantities of 100 pounds and over at one time. For less than 100 pounds, three cents additional.

HIGH BRASS.

All Nos. to No. 28, and widths 14 in. and under..........27c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive..........30c
Over 20 in. to 30 in., inclusive..........38c
½c. ℔ ℔ advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 38 is Platers' Brass, at.....45c
Sheets 24x48 in. and all sheets cut to particular sizes and lengths..........33c
Printers' Rules..........40c
Sheets wider than 30 in and under 40 in..........40c
" " " 40 in. and over..........42c
Circular sheets, in diam. from 4 in. to 14, inclusive.....37c
" " " over 14 " 20, "....40c
" " " " 20 " 30, "....43c
" " " " 30 " 40, "....46c
" " " " 40 in..........49c

LOW BRASS.

Four cents ℔ ℔ more than High Brass.
Gilding Metal, 7c, ℔ ℔ more than High Brass.
Platers' or Gold Metal { In Bars..........42c
{ Sawed..........43c
{ Planed or Polished..........48c

FOR SLITTING.

Metal, in width 2 in. to ⅛ in. to No. 30, inclusive, 1c. per ℔. advance.
Metal, in width 2 in. to 1 in., thinner than No. 30, 2c. per ℔. advance.
Metal, in width 1 in. to ⅛ thinner than No. 30, 3c. per ℔. advance.
Metal, in width ⅛ in. to ¼, to No. 30, 2c. per ℔. advance.
Metal, in width ⅛ in. to ¼ thinner than No. 30, 5c. advance.
Metal, ¼ in. in width and less, 10c. per lb. advance

GERMAN SILVER MARKET METAL AND WIRE

	Market Metal.	Wire.
4 per cent., 12 in., to No. 26	$0 60	$0 80
6 " " "	·70	·90
10 " " "	·80	1·10
15 " " "	1·00	1·35
18 " " "	1·10	1·50
20 " " "	1·20	

German Silver Sheets over 12 in. wide, and weighing more than 16 ℔s., $2 per ℔., net.
Advance 2c. for each additional in., in width above 12 in., and 2c. per ℔. on each No. thinner than Nos. 26 to 36 inclusive.
All German Silver thinner than No. 36 is Platers', at 50c. per ℔. additional.
German Silver Scrap one-third less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
Nos. 0 to 20	0·30	0·34	0·40
Nos. 21, 22, 23	0·31	0·35	0·42
Nos. 24 and 25	0·32	0·36	0·43
Brass Rods, No. 8 and larger	0·36	0·40	0·46
Wire straightened and cut, smaller than No. 8	0·40	0·44	0·50

Fancy Wire not less than 4 cents per pound advance of Round Wire.
Spring Wire, 2 cts. per lb. advance.

FINE WIRE, BY THE OLD ENGLISH FINE WIRE GAUGE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 26	0·41	0·45	0·51
No. 27	0·44	0·48	0·54
No. 28	0·46	0·50	0·56
No. 29	0·48	0·52	0·58
No. 30	0·50	0·54	0·62
No. 31	0·52	0·56	0·66
No. 32	0·56	0·60	0·71
No. 33	0·60	0·64	0·81
No. 34	0·64	0·68	0·91
No. 35	0·69	0·73	1·03
No. 36	0·78	0·82	1·15
No. 37	0·98	0·98	1·28
No. 38	1·28	1·28	1·58

Ten cents per pound extra for Spooling.

TUBING.

Plain to No. 20 inclusive, above ⅜ in. to 1½ in..........℔ ℔ ·44
" 1½ to 3 in. inclusive..........·38
" above 3 in..........·50
Nos. 21, 22, 23, two cents advance on List for each Number.
Nos. 24, 25, 26, four cents advance on List for each Number.
Above No. 26, special rates.
Plain ⅜ inch..........·50
" 5-16 "..........·60
" ¼ "..........·80
" 3-16 "..........1·20
" ⅛ "..........1·60
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing, 4 cents advance on List above Plain.
English, Scotch and Extra Patterns Fancy Tubing to No. 20, 9 cents above Plain.
Tubing Sawed or Cut 2 to 4 feet long, 2 cents advance on List.
Add to 2 cents ½ cent for each additional cutting under two feet.
All Mandrel Drawn Tubes under ⅜ in., 25 cents per pound advance.

ZINC TUBING.

Plain..........·28
Fancy..........·31
Scotch and Extra Patterns..........·34

GERMAN SILVER TUBING.

4 Per cent..........·85
6 "..........·95
9 "..........1·10
12 "..........1·25
15 "..........1·40
16 "..........1·45
18 "..........1·55
20 "..........1·65

MISCELLANEOUS.

Common Plain Brass Pail Ears..........·39
Hose Pipes, 500 and over..........·71
" under 500..........·76
Door Rail..........·40

SCRAP.

High Brass Scrap, 16 cents.
Low " 18 cents.
Gilding, 20 cents.
Turnings, Filings and Chips, half the price of Scrap.
Orders for Goods on this list received on or after this date, will be filled at the rate herein stated.
Terms—Net cash. No discount allowed. Interest to be added after thirty days.

ANTIMONY..........14½c. gold

LEAD—Duty: Pig $2 per 100 lbs.; old Lead, 1½ cent per lb.; Pipe and Sheet, 2½ cents per lb.
Spanish..........7c gold
German Refined..........6¾c gold
English..........6¾ @ 7c gold
American..........6 @ 6½c gold
Bar..........dis 10 %..........8¾c.
Pipe..........dis 10 %..........9c.
Tin Lined Pipe..........dis 10 %..........16½c.
Sheet..........dis 10 %..........9½c.
Shot..........dis 10 %. Drop, 9½c. Buck, 10½c.

BABBITT METAL.

N. P. U..........℔ ℔ 8¾ @ 9c
A., 25c.; B, 20c.; C, 15c.; D, 12c. ℔ ℔.

SOLDER..........No. 1, 15c.; No. 2, 14c

STEEL—Duty: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2¼ cents; over 7 cents, and not above 11, 3 cents per lb. over 11, 3½ cents per lb. and 10 % ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as

American Cast Steel.

Tool..........15 @ 16c
Spring..........10c
Homogeneous..........12½c
Tire..........12½ @ 13½c
Machinery (round and square)..........10 @ 11c
File..........11c
Sheet..........14 @ 16c
Saw Plate, mill and mulay..........14 @ 16½c
Saw Plate, gang and X cut..........13 @ 14c
" circular as to size..........18 @ 30c

Chrome Steel.

Tool..........℔ ℔ 20 @ 21c
Tool, extra fine..........40 @ 75c
Spring..........℔ ℔ 12c and upward
Machinery..........℔ ℔ 14c
Hammer.......... " 15c
Gun or Homogeneous.......... " 16c

English Steel.—payable in gold, net.
Best Cast..........℔ ℔ 17½c
" Extra Cast.......... " 18½c
" Round Machinery, Cast..........℔ ℔ 10½ @ 11½c
" Swaged, Cast.......... " 19½c
" Best Double Shear.......... " 17½c
" Blister, 1st quality.......... " 14½c
" " 2d quality.......... " 13 c
German Steel, Best.......... " 11½c
do 2d quality.......... " 10½c
3d quality.......... " 9½c
Sheet Cast Steel, 1st quality.......... " 17½c
" " 2d quality.......... " 14½c
" " 3d quality.......... " 12½c
File Steel, Flat and ½ Round.......... " 12½c
" Square and Round.......... " 12½c
" Mill.......... " 13½c
" Taper to 4 inch.......... " 16c
" Taper 3 and 3½ inch.......... " 18c

SPELTER—Duty: In Pigs, Bars and Plates, $1 50 per 100 lbs.
Silesian, cash..........6¾ @ 7c., gold
American "..........7½ @ 11c., currency

TIN—Duty: Plates, Sheets, Tagger and Terne, 1½c per lb.; Electro-galvanized Plates, 2 cents per ℔; Manufactures of, not enumerated, 35 per cent. ad val. Bars, Block and Pigs, free. Banca, subject to duty of 10 per cent.
Banca..........℔ ℔ 28c., currency
Straits..........℔ ℔ 23c., currency
English..........℔ ℔ 22½c., currency

TIN PLATES, CURRENCY PRICES.

I C 10x14, Prime Charcoal..........8·75
12x12, "..........9·25
14x20, "..........9·50
I X 10x14, "..........11·00
12x12, "..........11·50
14x20, "..........12·00
D C 12½x17 "..........8·25
D X 12½x17 "..........10·50
For each additional X add..........2·25

COKE TIN PLATE.

	Best.	2d Quality.	Ordinary.
I C 10x14	$8·50	8·00 @ 8·25	7·75 @ 8·00
I C 12x12	9·00	8·25 @ 8·50	
I C 14x20	9·25	8·50 @ 8·75	7·75 @ 8·00

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$ 8·25	7·75 @ 8·00	·50 @ 7·75
I X 14x20	10·50		
I C 20x28	17·50	16·25 @ 16·75	15·75 @ 16·00
I X 20x28	22·50		
I C 20x200			

ZINC.—Duty: Pig or Block, $1 50 per 100 lbs. Sheet 2½c. ℔ ℔.
Sheet..........cask 10½c
"..........open 10½c

Paper Stock, Old Metals, &c

(Dealers' Selling Price.)

Canvas linen..........6 @
" cotton, No. 1..........6¼ @ 6½
" " No. ....@ 3½
White linen rags, No. 1..........6¼ @
" " No. 2..........4½ @
Colored..........2½ @
Mixed woolens..........2½ @ 3¼
Soft woolens..........5½ @ 6¼
Gunny bagging..........2 @ 2½
Jute Butts..........2¼ @ 2½
Kentucky bagging..........5¼ @ 5½
Book stock..........4 @ 4½
Waste paper and scraps..........1 @ 1½
Rope cuttings..........1½ @ 3
Kentucky Bale rope..........4 @ 4½
Oakum junk, No. 1..........5¼ @ 5½
" No. 2..........@ 4
Grass rope..........3¼
Tarred Shaking..........1½ @ 1½
White Collar Cuttings, all paper..........7 @
" " " muslin lined..........5 @
" Envelope "..........7 @
Hard White Shavings, No. 1..........6¼ @
Soft " " No. 1..........6 @
White Shavings, No. 2..........5½ @
Mixed Shavings, part white..........4 @ 4½
Imperfections, No. 2, best folded sheets..........5 @
" 1, Heavy Stock..........4½ @
Book Stock, Mixed..........3½ @
" " No. 2, light..........2½ @ 2½
Prints..........1½ @ 2
Pure Manilas..........2½
Bogus Manilas and Hardwares..........1 @ 1½
Commons..........1 @ 2
Binders' Board Cuttings..........1½ @ 1
Straw Board Cuttings..........1½ @
Woolen Tailor Clips..........12 @
Satinet Tailor Clips..........1½ @

Old Metal.

Copper..........@ 19
Yellow metal..........14 @
Brass..........13 @ 14
Heavy Composition..........16 @ 17
Old lead, solid..........6 @ 6½
Tea lead..........5½
Wrought iron..........1½ @
Sheet iron..........0¾ @ 0½
Cast iron..........¾
Machinery iron..........@ 1
Zinc..........5 @ 5½
Pewter, No. 1..........17 @
" No. 2..........10 @ 12
Spelter..........@ 5

Paints, Oils, etc.

Paints.

Black lamp—Coach Painters..........℔ ℔ 20c
" " Ordinary..........6c
" Ivory Drop, fair..........15c
" " best..........26c
Black Paint, in oil..........kegs, 8c.; ass't'd cans, 11 c
Blue, Prussian, fair to best..........50 @ 75c
" " " in oil..........55 @ 65c
" Chinese dry..........88c
" Ultamarine..........25 @ 90c
Brown, Spanish..........1½c
" Van Dyke..........
Carmine, 40..........$12 00
Green, Chrome..........15 @ 23c
" " in oil..........18 @ 25c
" Paris..........good, 30c; best, 40c
" " in oil.......... " 30c " 45c
Mineral Paints..........1½ @ 4c
Orange Mineral..........14c
Red Lead, American..........9½c
" " English..........10½c
" Venetian (N. C.) dry..........2½c
" " in oil..........ass't'd cans, 11c; kegs, 8½c
" Indian, dry..........10c
Rose Pink..........18c
Sienna, American, Raw..........4c
" Burnt..........4½c
" " in oil..........16 @ 25c
" Raw " ....15 @ 25c
Umber, Burnt..........4 @ 8c
" " in oil..........16 @ 21c
" Raw..........3½ @ 7½c
" " in oil..........16 @ 22c
Vermillion, Chinese..........1 60, gold
" English..........90c., gold
" Trieste..........1 10
" American, Common..........28c
White Lead, American, pure dry..........10c
" " in oil..........11c
White, Paris, English, prime..........in bbls. 2¼ @ 2½c
Yellow Ochre, French..........2¼ @ 2½c
" " " in oil....ass't'd cans, 11c; kegs, 8½c
" " Vermont..........in casks 1½c
Yellow Chrome..........17 @ 27c
" " in oil..........18 @ 28c
Zinc White, American No. 1 dry..........9c
" " 1, in oil..........11c
" French (Paris)..........11c
" " in oil..........13c

Oils.

Linseed Raw..........℔ gal. casks, 61c. bbl., 63c
" Boiled.......... " 66c " 68c
Whale, Crude..........
" Bleached Winter..........75c
Sperm, Crude..........bbl. 1·65
" Winter unbleached.......... " 1·90
" " Bleached.......... " 2·00
Seal, Extra Refined.......... "
Lard, Pure Winter.......... " 1·15
" Spring.......... " 1·15
Cotton Seed, Crude..........62c
" Southern Yellow..........67c
" White..........
Neatsfoot, Winter..........70c @ $1·10
Natural Lubricating..........38c @ 40c

Sundries.

Asphaltum..........9c
Benzine..........℔ gal. 16c
Chalk..........1½c
" Block..........
Dryer, Patent, Am'n..........ass't cans, 10½c.; kegs, 9c
" " English.......... " 1 c.; " 9c
Flocks..........
Frostings..........50c
Glue, White..........33 @ 47c
" Sheet..........20c
Glaziers' Points, Zinc..........9c
Gum, Copal..........86c
" Damar..........25c
" Shellac, English..........75c
" " " dark..........65c
Litharge..........10c
Pumice Stone, selected Lumps..........4 @ 6c
" powdered..........4c
Putty in bladders..........3½c
" in bulk..........3
Rotten Stone, soft, English..........8c
Spirits Turpentine..........38c
Whiting, Spanish..........¾c

Glass.

French Window—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SINGLE THICK.

SIZES.	I.	II.	III.	IV.
6 x 8 to 10 x 15	$7·50	$6·75	$6·25	$5·75
11 x 14 to 16 x 24	8·50	7·75	7·25	6·50
18 x 22 to 20 x 30	10·75	9·75	8·75	7·75
15 x 36 to 24 x 30	12·25	10·75	9·00	
26 x 28 to 24 x 36	13·00	11·50	9·75	
26 x 36 to 26 x 44	14·50	13·25	10·75	
26 x 46 to 30 x 50	15·00	14·00	11·25	
30 x 52 to 30 x 54	16·00	14·50	12·00	
30 x 56 to 34 x 56	17·25	15·50	13·50	
34 x 58 to 34 x 60	18·25	17·25	15·00	
36 x 60 to 40 x 60	20·75	18·75	17·25	

DOUBLE THICK.

SIZES.	I.	II.	III.	IV.
6 x 8 to 10 x 15	$12·00	$11·00	$10 00	$9·25
11 x 14 to 16 x 24	13·75	12·50	11 75	10·50
18 x 22 to 20 x 30	17·25	15·75	14·00	
15 x 36 to 24 x 30	19·75	17·25	14·50	
26 x 28 to 24 x 36	21·00	18·50	15·75	
26 x 36 to 26 x 44	23·25	21·25	17·25	
26 x 46 to 30 x 50	24·00	22·50	18·00	
30 x 52 to 30 x 54	26·75	23·25	19 25	
30 x 56 to 34 x 56	27·75	25·00	21·75	
34 x 58 to 34 x 60	29·25	27·75	24 00	
36 x 60 to 40 x 60	33·25	30·00	27·75	

Sizes above—$12·00 per box extra for every 5 inches.
An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches will be charged in the 81 united inches bracket
Discount 50 @ 50&5 %.

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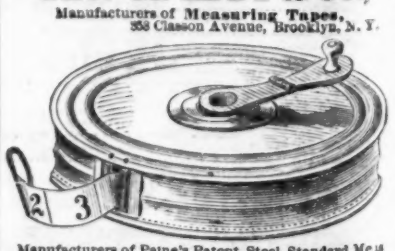

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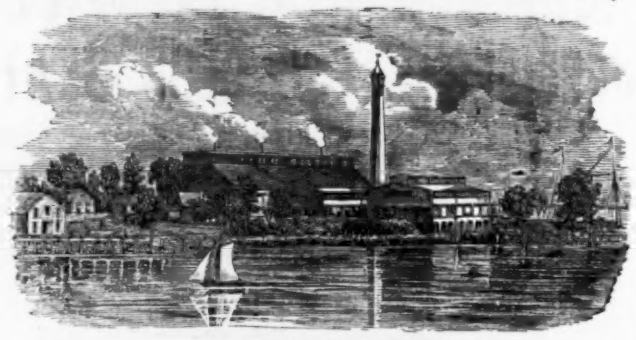

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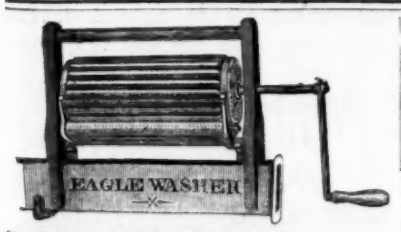

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Patented May 4, 1875.

Set No. 1	3 Irons of 5, 6 and 7 lbs.	1 Handle	$2 00
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" 3	3 " 7, 8 and 9 lbs.	"	2 60
Nickel Plated Irons			75 cents extra.

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LIEGE (Belgium), Represented by Mr. LOUIS MULLER.

Manufacturers and Importers of **Cutlery, Guns, Hardware** and **Railroad Material.**

Proprietors of **TRENTON VISE AND TOOL WORKS, Trenton, N. J.**—Vises, Picks, Mattocks, Grub Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.

Proprietors of the **MANHATTAN CUTLERY CO.,** "O. K." Razors.

Sole Agents for **LAMSON & GOODNOW MFG. CO., Shelburne Falls, Mass.**—Table Cutlery and Butcher Knives.

W. & S. Butcher's Files, Edge Tools and Razors, the largest stock in the United States.

Geo. Wostenholm & Son's Knives, Scissors and Razors, the largest stock in the U. S.

John Wilson's Butcher and Shoe Knives.

Peter Wright's and Armitage Anvils.

We always have on hand a full assortment of

German and English Hardware, Cutlery, Guns, Gun Material, Chains, Heavy Goods.

REED & BARTON,

Manufacturers of **FINE**

Electro-Plated Table Ware

OF EVERY DESCRIPTION,

Would invite especial attention to the great variety of new and original designs of

Dinner, Tea and Water Sets, Epergnes, Cake and Fruit Dishes, Ice Pitchers, Vases, Mantel Ornaments, &c.,

SUITABLE FOR

BRIDAL & HOLIDAY PRESENTS.

Salesroom, No. 2 Maiden Lane, New York.

Factories, Taunton, Mass.

WESTON'S

Differential Pulley Blocks

Also known as

DOYLE'S, HALL'S AND BIRD'S

are now all merged and are controlled exclusively by

THE YALE LOCK MFG. CO.,

HENRY R. TOWNE, President, Stamford, Conn.

VAN WART & McCOY, New York Agents, **134 & 136 Duane Street.**

T. A. WESTON, Mechanical Engineer, with the Company.

SOMETHING NEW!

"Zero" Stove Cover Lifter.

Patented July 27th, 1875.

Made in one piece from a superior quality of sheet iron, with a perforated cylindrical handle. Its superior advantages over any other style of cover lifter are manifest, as it will not break or bend, keeps always cool, and will fit any stove cover made. Send for Circular.

EAST RIVER SHEET METAL MFG. CO.,

SOLE MANUFACTURERS, **253 Pearl Street, New York**

IVES, WOODRUFF AND CO.

MANUFACTURERS OF

Eagle Screw Clamps,

FINE

CARRIAGE MOUNTINGS

in Iron, Brass, Oroide, Silver and Gold.

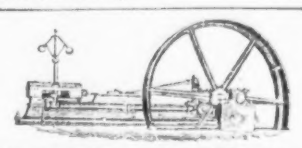
SUPERIOR

Malleable Iron

Made under the

ANDREW'S PATENT PROCESS.

Mount Carmel, - - CONN.



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Successors to the

Woodruff & Beach Iron Works,

HARTFORD, CONN.

J. S. Hunter, Prest. E. J. Murphy, Treas. & Sec.

High and Low Pressure Marine & Stationary

STEAM ENGINES AND BOILERS,

Mining, Powder & Paper Mill Machinery,

And every variety of Iron and Composition Castings made to order.

The following are a portion of the Engines manufactured at these works, and are a sufficient guarantee of our capacity for doing first-class work, viz.: The Pumping Engines in the cities of Brooklyn, N. Y.; St. Louis Mo. and Hartford, Conn., and in the Charlestown, Mass and Norfolk, Va. Navy Yards, and the engines in the U. S. Steam Sloops of War Michigan, Kearsage, Manitou, Minnetonka and Piscataqua and the Gun Boats Cayuga, Pequot and Nepsic, the Government Transports Dudley Buck and Geo. C. Collins, and the Steamships America and United States. Also the large Horizontal Engine for the new Plate Mill of the Bay State Iron Co.

E. S. LEE & CO.,

ROCHESTER, N. Y.

Illustrated and descriptive circular of

WATER'S IMPROVED

Tree Pruner,

For 1876,

will be mailed free to applicants.

We offer **large discounts** to Jobbers and Hardware Dealers. Receives first premium at all fairs where shown. Has no Competitor. Light, Durable, Cheap.

Prices:

4 foot pole	$2 50
6 "	2 75
8 "	3 00
10 "	3 25

PUMP AUGERS and REAMERS

A SPECIALTY.

1760.  1875.

Solid Cast Steel Pump Augers

A full line always in stock. **Socket Shanks, Ring Handles, and Connecting Rods,** furnished to order.

Send for Price Lists to

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COMMISSION HARDWARE HOUSE.

EDW'D M. KEITH,

(Late of KEITH & KELSO.)

No. 25 S. Charles Street, - - BALTIMORE,

SOLE AGENT FOR

Chesapeake Nails, R. Mann's Axes,

NAYLOR & CO.'S CAST STEEL AND NAIL RODS,

And S. Loring's Tacks,

AND DEALER IN

General Hardware.

SOLICITS CONSIGNMENTS.

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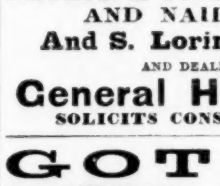

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FOR HEATING

Houses, Schools, and Churches.

FOR

COAL and WOOD.

Combines many improvements in Warming: *Economy, Durability, Power, Freedom from Gas.*

Send for Catalogue.

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226 West 23d Street, N. Y.

Alexander Brothers,

Manufacturers of **OAK TANNED**

LeatherBelting

410 & 412 North 3d, Philadelphia, Pa.

CHARLES W. ARNY,

Manufacturer of the Best

Oak Leather Belting,

AND

FAUGHT'S

Patent Round Braided Belting,

148 North 3d Street, PHILADELPHIA

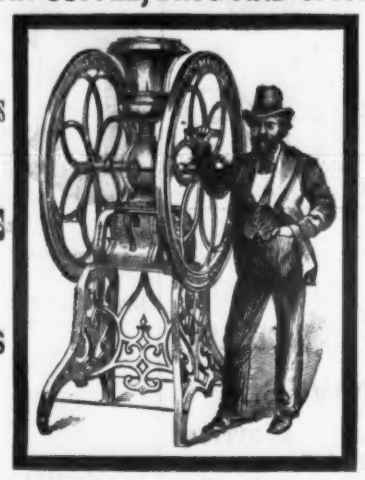
TWO SILVER MEDALS AWARDED

ENTERPRISE MANF'G CO. OF PA.

PHILADELPHIA,

FOR

AMERICAN COFFEE, DRUG AND SPICE MILLS.



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BUNG-HOLE BORERS,

TOBACCO CUTTERS

Cheese Cutters,

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Etc., Etc.

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AGENTS,

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NO EXTRA CHARGE FOR

NICKEL-PLATED HOPPERS WITH EAGLE DOME TOPS.

SEND FOR ILLUSTRATED CATALOGUE.

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Manufacturers of

Wrought Butts, Strap & T Hinges, Wrought Hooks, Hasps & Staples, Wrought Repair Links & Washers,

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PROVIDENCE, R. I., Manufacturers of

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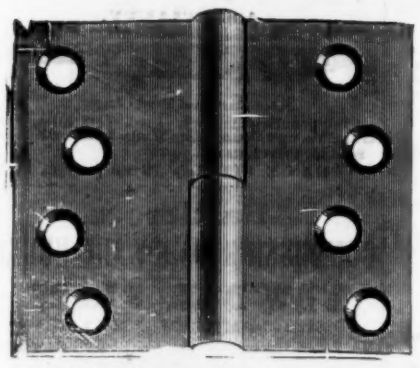

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New York Warehouse with

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Send for Price List.

QUACKENBUSH, TOWNSEND & CO.,

Hardware, Cutlery, &c.

59 & 61 Reade Street, N. Y.

Depot for

THOS. JOWITT & SONS,

(Sheffield, England,)

FILES and HORSE RASPS.

Rough & Ready

And

CLIPPER SCYTHES,

Warranted.

Manufacturers of the

CHALLENGE DOOR & GATE SPRING.

PATENTED JULY 11TH 1871.

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Agents for

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"BEAVER"

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FILES and HORSE RASPS.

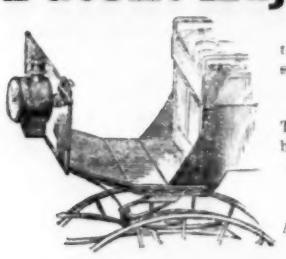
"WIDE AWAKE"

AXES.

BOUDREN'S

Patent Adjustable Dash-Lamp

FOR NIGHT DRIVING.



Throws a powerful Light 100 feet ahead of the horse. Burns Kerosene without a chimney for 10 hours after one filling.

Fits any shaped Dash or on any vehicle. Splendid Barn Lantern;

Also good for Deer Hunting.

The light is not affected by wind, rain or jolting. No person should be without one.

Price $6, C. O. D., with privilege of examining. Address,

WHITE MFG. CO., Bridgeport, Conn.

A liberal discount to dealers. Send for Circular.

See illustrated article in *The Iron Age* of Oct. 14.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,
Ring Bush Hooks,
Axe Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
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PLYMOUTH TACK AND RIVET WORKS

PLYMOUTH, MASS., manufacturer of

TACKS, BRADS, NAILS AND

RIVETS.

Swedes and Common Iron Tacks; Leathered, Carpet Brush, Lace and Gimp Tacks; Finishing, Hungarian, 2d, 2d and 3d Fine, Trunk, Clout, and Cigar Box Nails; Black and Tinned Trunk Nails; Zinc, Iron, Copper and Steel Shoe Nails; Brads and Patent Brads; Glaziers' Points, &c., &c., &c., COPPER, BRASS AND IRON RIVETS, of all kinds. Coopers' Rivets, from 1d to 6d, in casks of 100 lbs. each. Hose, Belt and Shoe Rivets and Burs. Oval and Countersunk Heads of extra lengths, made to order. SHIP AND BOILER RIVETS OF ALL SIZES AND LENGTHS

COBB & DREW,

Plymouth, Mass.

Manufacturers of Copper, Brass, and Iron Rivets: Common and Swedes Iron, Leathered, Carpet, Lace and Gimp Tacks; Finishing, Hungarian, Trunk Clout and Cigar Box Nails, &c. Rivets made to Order.

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HARDWARE.

165 Greenwich Street.

Agent for the Philadelphia Star Carriage and Tire Bolts

FLUTING MACHINES.

The Celebrated K. F. M.

Manufactured for the Trade by

HENRY SOMMER,

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Established in 1836.

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Manufacturers of every variety of

TACKS & SMALL NAILS,

Carriage, Machine, Plow, Stove and Tire Bolts, Coach Screws, Bed Screws, &c.

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It is the most convenient, durable, safe and reliable Snap ever used. It is easily operated with glove or mitten on. It has a brass coil spring that is four times as long as any other coil spring snap, which will neither rust nor be affected by cold, like steel springs in common use. It is enclosed in the barrel back of the bolt, making a snap which works freely under all circumstances, and without danger of having its parts broken or disarranged. We manufacture all sizes of Harness Snaps and Round Eye Snaps, and Covert's Patent Thimble to go on rope for Cattle and Horse Ties. Also other goods.

Send for price list and circulars.

HOLD BACK & SNAP CO., Troy, N.Y.

Established in 1839.

A. G. COES & CO.

WORCESTER, MASS.,

Manufacturers of

THE GENUINE

COES'

SCREW WRENCHES.

Our goods have been very much improved recently, by making the *Bar WIDE*, as shown in the cut, which makes a 12 in. Wrench as strong as a 15 in. made in the ordinary way, and by using

A. G. COES'

NEW PATENT

FERRULE

Which cannot be forced back into the handle.

☞ Our goods are manufactured under Patents dated February 7, 1860, (re-issued June 29, 1871), May 2, 1871, and Dec. 26, 1871, and any violation of either will be *vigorously prosecuted.*

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

A. G. COES & CO.

TUCKER & DORSEY,

MANUFACTURERS,

Indianapolis, Ind.

The Hart, Bliven & Mead Mfg. Co.,

18 & 20 Cliff Street, and 243 & 245 Pearl Street, New York.

Factories at KENSINGTON, CONN.

MANUFACTURERS, IMPORTERS AND DEALERS IN

GENERAL HARDWARE.

AGENTS FOR THE

Patent Bessemer Metal Wood Screws,

MANUFACTURED BY

UNION STEEL SCREW CO.,

CLEVELAND, OHIO.

We are prepared to furnish these Screws at manufacturers' prices, either Bright or Annealed, and will warrant them the strongest and most perfect Wood Screws in market.

In making orders, please state whether Annealed or Bright are wanted (we consider the former preferable); also, if it is desirable to have them shipped direct from Cleveland, Ohio. We deliver there or in New Nork free of freight.

J. CLARK WILSON & CO.,

P. O. BOX 2355.

81 Beekman Street, New York.

Northampton Skate Co.,

SHEFFIELD STEEL CLUB SKATES.

THE BEST IN THE WORLD.

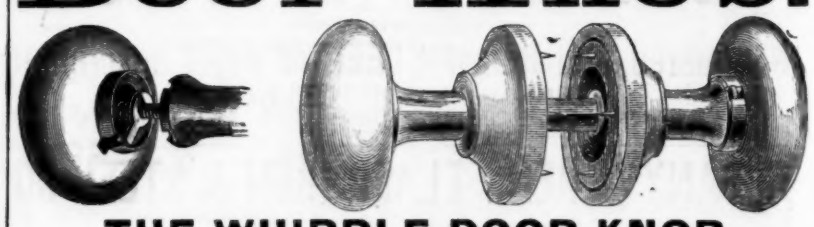
No Buckle to break. NO STRAPS to stop Circulation.

SELF-FASTENING.

FOR SALE BY ALL HARDWARE DEALERS.

WHIPPLE'S PATENT

Door Knob.



THE WHIPPLE DOOR KNOB

Is the only perfect Door Knob Attachment ever invented.

AWARDED A BRONZE MEDAL

At the American Institute Fair, in New York, for 1874.

NO SCREWS USED IN NECK OR ROSES.

Adjusts Perfectly to Doors of Different Thicknesses

WITHOUT THE USE OF RINGS.

The attention of Architects, Builders and Carpenters is specially desired. Circulars fully describing the advantages of this Knob, with Price List, sent on application to

The Parker & Whipple Co.,

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Or 97 CHAMBERS STREET NEW YORK.

CAPEWELL'S

GIANT NAIL PULLER.

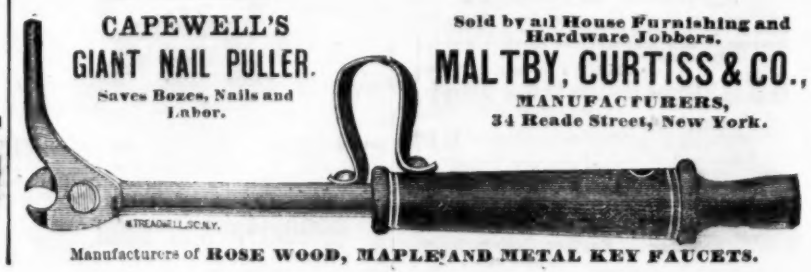
Saves Boxes, Nails and Labor.

Sold by all House Furnishing and Hardware Jobbers.

MALTBY, CURTISS & CO.,

MANUFACTURERS,

34 Reade Street, New York.



Manufacturers of ROSE WOOD, MAPLE AND METAL KEY FAUCETS.

PHILADELPHIA.

(Corrected weekly by Lloyd, Supplee & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.—Solid Cast Steel ......⅌ ℔ 14c
Peter Wright's, ⅌ ℔, gold 11½c
Wilkinson's " ......11 c
Eagle ......list 11 cents—dis 20 @ 20&10 %
Apple Parers.—Victor ......per doz $7 75
Domestic ......" 7 75
Reading ......" 7 75
Bay State Paring, Coring and Slicing ......" 15 00
" " Peach Parers ......" 10 50
10 doz. lots 50c. per dozen discount.
Axes.—
Mann's (according to weights)..Per doz. $11 50 @ 10 00
Red Indian. " " " " 11 50 @ 10 50
Red Chieftain, " " " " 12 00 @ 11 00
Crown Prince " " " " 12 00 @ 11 50
Hunt's " " " " 12 50 @ 11 50
Augers and Auger Bits.—Pierce's Pat. Twist Bits ......dis 30 %
Douglass' & Ives' Bits ......dis 40&10 %
Connecticut Valley Auger Bits ......dis 40&10 %
Cook's Bits ......dis 40 10&10 %
Jennings' Bits ......dis 10 %
Bates' Nut Augers ......dis 40&10 %
Douglass' & Ives' Augers ......dis 40&10 %
Watrous' Ship Augers ......dis 10&15 %
Bonney's Pat. Hollow Augers ......dis 25 %
Stearns' Patent Hollow Augers ......dis 25 %
Balances.—
Landers, Frary & Clark's ...... } Sold on Morton's new
Morton's ...... } List ......dis 50 %
Chattillon's ...... }
Common Spring with Hook ......⅌ doz $1 38 @ 2 00
Bells.—Bevin Bros. Mfg Co. Light Hand Bells ......dis 70 %
Common (Tissue Paper Weight) ......dis 70&10 %
Swiss Pattern Hand Bells ......dis 50 %
Connell's Door Bells ......dis 50&5 @ 50&10 %
Gt. Western & Kentucky Cow. . dis 50&10 @ 50 10&5 %
Boring Machines.—Bates' Mfg. Co., complete with augers ......dis 20 @ 25 %
Douglas Mfg. Co., complete with augers..dis 20 @ 25 %
Common Boring Machines, no Augers ......$4 00 @ 3 75
Angular " " ......5 00 @ 4 75
Bolts.—Eastern Carriage Bolts ......dis 75 %
Western " " ......dis 75 %
Philadelphia " " ......dis 60 %
" Eagle, (Coleman's) ......dis 60 %
Wrought Shutter, Stanley ......dis 50 @ 50&10 %
Braces.—Barber's ......dis 40&5 %
Backus ......dis 50 %
Bartholomew's American Ball ... dis 10&10 @ 15&10 %
Spoffard ......dis 50 %
Butts.—Cast Fast Joint, Narrow... dis 25&10 @ 30&10 %
" " Broad ......dis 35&10 @ 40&10 %
Cast Fast Loose Joint ......dis 45&10 @ 50&10 %
" Acorn. Loose Pin ......dis 40&10 @ 45&10 %
" Mayers & Parliament ......dis 35&10 @ 40&10 %
" Acorn Jap'd ......dis 45&10 @ 50&10 %
Wrought Loose Pin ......dis 35 %
" Table Hinges and Back Flaps ......dis 40 %
" Narrow ......dis 30 %
" Loose Joint ......dis 35 %
Parker's Blind Butts.... }
Buffalo Hdw. Co. " ... } Discount 65 %; by the case
Clark's " ... } 65&10%.
Shepard " ... }
Lull & Porter's (Phila.) Hinges....dis 60 %; case, 60&5 %
Garretson's No. 0 Hinges ...... } 65&10 %
Cherrytree No. 0 " ...... }
Chains.—German Halter ......dis 20 %
" Coil ......dis 20 %
Galvanized Pump ......net 13 @ 13½c
Best Proof Coil Chain—

⅌ ℔	12½	9½	8¾	8¼	8	7¾	7c gold
	3-16	¼	5-16	⅜	7-16	½	¾ in.

By the cask, 560 lbs., ½c per lb. less Common Chain, ½c per lb. less.
Chisels.—Socket Framing ......dis 60 @ 60&10 %
Socket Firmer ......dis 60 @ 60&10 %
Tang " ......dis 40&10 @ 50 %
Beaty's Framing and Firmer ......dis 20 %
Casters.—Iron Bed ......dis 30&10 @ 40 %
Porcelain Wheel Bed ......dis 40&10 @ 50 %
Iron and Brass Wheel Plate ......dis 40 @ 40&10 %
Porcelain Wheel " ......dis 50 @ 50&10 %
Clothes Wringers.—Universal ......per doz $72 00
Novelty ......" 72 00
Discount on 2 dozen lots, $2 per dozen.
Coffee Mills.—Common Box and Side ......dis 15 %
Patent Box and Side ......dis 15 %
Cutlery.—American Pocket (best) ......dis 25 %
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices
Drawing Knives.—Hart Mfg. Co.'s ......dis 60 %
Adjustable Handle ......dis 10 @ 15 %
Beatty ......dis 15 @ 20 %
Fry Pans.
Tinned ......dis 40 @ 45 %

⅌ doz..	$3 50	4 00	4 50	5 00	5 50	6 50	7 50	9 00	10 00
No.....	0	1	2	3	4	5	6	7	8

Burnished ......dis 40 @ 45 %

⅌ doz..	$3 00	3 75	4 25	4 75	5 25	6 00	7 00	8 00	9 00
No.....	0	1	2	3	4	5	6	7	8

Files.
Nicholson Mill Files ......new list
" Bastard ......"
" Taper ......"
Butcher's Mill ......$4 75 to £ gold
" Bastard ......4 75 to £ gold
" Taper ......4 75 to £ gold
Fluting Machines.
K. F. M.—4⅜ in. rolls ......$3 75 net
" —6 in. rolls ......4 00 net
Mrs Knox—4½ in. rolls ......3 75 net
" —6 in. rolls ......4 00 net
Hammers.
Yerkes & Plumb's ......dis 15 @ 20 %
Hammond & Son's ......dis 15 @ 20 %
Veree ......dis 20 @ 25 %
Hatchets.
Beatty's ......dis 25 %

Shingling and Half.	⅌ doz...	$7 00	7 50	7 75	8 00
	No......	1	2	3	

Yerkes & Plumb ......dis 20 @ 25 %

Shingling and Half.	⅌ doz...	$7 00	7 50	8 00	8 50
	No......	1	2	3	4
Claw....	⅌ doz......	$7 50		8 00	
	No......	1		2	3

Hinges.
Strap and T ......dis 50 %
Horse Nails.

	Nos. 5	6	7	8	9	10
Ausable		27	25	24	23	22
Globe		28	26	25	24	23
Brundage		26	24	23	22	21
Putnam	32	28	26	25	24	23

On Ausable, Globe and Brundage 1000 ℔ lots......dis 5 %
Knobs.—Door, Mortise and Rim.
Makes in Combination ......new list dis 45&5 %
Extra discount for cash 2 %
Mineral and Rim ......dis 5 %
Locks and Latches.—Rim and Mortise.... dis 40&5 %
Extra discount for cash 2 %
Till and Cupboard ......dis 25 %
American Padlocks ......dis 30 %
Extra discount for cash 2 %
Scandinavian Pad Locks.

⅌ doz......	$10 50	10 50	12 00	12 00	15 00	15 00	dis 25 %
No........	59	59½	60	60½	61	61½	
⅌ doz......	$18 00	18 00	22 00	22 00			dis 25 %
No........	62	62½	63	63½			

Trunk Locks ......dis 5 @ 10 %
Thumb and Roggens Latches ......dis 25 %
Lanterns.—Square Candle and Oil ......dis 10 %
Globe for Oil ......dis 10 %
" " Kerosene ......dis 10 %
Tubular Lanterns ......dis 10 %
Mattocks.—Long and Short Cutter ......dis 25 %
Western Pattern ......dis 25 %
Pennsylvania Pattern ......dis 15 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets ......dis 20 %
Stebbins' Gates ......dis 62½ @ 62½&10 %
Lincoln's " ......dis 40&10 @ 50 %
Landers, Frary & Clark's Petroleum ......dis 15&10 %
Taylor's Petroleum Faucets ......dis 20&10 %
Brass Liquor Cocks ......dis 20&10 %
Meat Cutters.—Dixon's ......dis 20 %
Woodruff ......dis 20 %
Stowe ......dis 20 %
Hale's ......dis 25 %
Stuffers ......dis 20 %
Planes.—Auburn Tool Co., "Bench" ......dis 40 %
Second Quality ......dis 50 %
Metallic Plane Co ......dis 25&5 %
Evans Pat. Circular ......net
Plumbs and Levels.
Adjustable ......dis 60&10 %
Non-Adjustable ......dis 60, 10&10 %
Plane Irons.—American ......list net
Butcher's ......gold £, $5 50
Picks.—Philadelphia ......net
Pittsburgh ......net
Rules ......dis 60&10 %
Rakes.—Cast Steel Garden ......dis 40 @ 40&5 %
Malleable Garden ......dis 40 @ 40&5 %
Wood Head Iron Teeth ......dis 40 %
Steelyards.—American Pattern ......dis 15 %

⅌ doz.....	$5 50	7 00	9 00	10 00	11 00	12 00
No........	50	100	150	200	250	300

English Pattern ......dis 15 %

⅌ doz......	$7 00	8 67	10 67	12 67	14 67	16 67
No.........	50	100	150	200	250	300

Hart's Pattern ......dis 30 %

⅌ doz.......	$14 50	17 75	21 00	26 50	31 50	35 50
No....	50	100	150	200	250	300

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened ......⅌ doz. $10 00
Clipper No. 10, Bronzed Blade Boxed and Sharpened ......⅌ doz. $9 50
Clipper No. 5, Painted Red, Boxed and Sharpened ......⅌ doz $9 00
Cast Steel Scythes ......$7 50 @ 8 00
German " ......6 50 @ 7 00
Squares.—Steel and Iron, new list ......dis 50 %
Saws.—Disston's Cross Cut ......dis 15 %
Disston's Hand ......dis 12½ %
W. McNiece's H'd, Cross-Cut & Circ'r, new list.dis 15 %
Boynton's Lightning, new list ......dis 40 %
" Champion ......dis 45 %
Shovels and Spades.
Rowland's Plain Back, Jan. 23d ......dis 35 %
" Back Strap " ......dis 35 %
Oliver Ames & Sons ......dis 30 %
Brady Shovel Co ......dis 20&5 %
Sad Irons.—Richmond (polished face) ......per lb. 3¾c
Richmond (polished face).... by the cask " 3½c
Stone.—Arkansas Oil, No. 1 ......⅌ ℔ $
Turkey Oil, No. 1 ......"
Washita Extra ......net " 3½c
" No. 1 ......net " 30c
" " 2 ......net " 15c
...... " 5½c

Screws.
United States and others in Combination ......dis 40 %
Keystone, not in Combination ......dis 40&5 %
Spoons.—
Plated ......dis 40&10 @ 50 %
Britannia, Boardmans (new list) ......dis 50&10 %
" Parkers (old list) ......dis 50 @ 50&10 %
German Silver ......dis 30 %
" Light ......new list dis 35 %
Lalance & Grosjean Iron ......dis 10 %
Springs.—Gray's Door ......dis 60&10 %
Torry's Door ......dis 60&10 %
Stocks and Dies. ......dis 10&5 %
Stove Polish.—Gem ......⅌ gross, $5 00
Onyx ......" $5 00
Try Squares.—Winterbottom ......dis 10 @ 15 %
Stanley Rule and Level Co ......dis 45&10 %
Willis Thrall, No. 2 ......dis 30&10 %
Disston's No. 2 ......dis 40 %
Tacks, &c.—Half Weight Tacks ......dis 72½ %
" " by the case.. dis 72½&7½ %
Clout and Finishing Nails ......7½ %
" " by the case ......dis 7½ %
Traps.—Genuine Oneida—Newhouse list ......dis 20 %
Imitation " " ......dis 30 @ 35 %
Vises.—Solid Box, currency ......⅌ ℔ 13½c
Wrenches.—Coes Genuine ......dis 40&5 @ 40&10 %
Coes Imitation Wrought Bar ......dis 50&5 @ 50&10 %
" " Malleable Bar ......dis 60&10 %
" " (Kellogg) Malleable Bar ......dis 65&10 %
Tafts Pattern (Wrought Bar) ......dis 70 @ 70&10 %
Philadelphia Tool Co.'s Pat. Duplex ......dis 25 %
" " " Improved Baxter ......dis 25 %
" " " Adjustable Fork ......dis 25 %
Wire.—No. 0 to 18.....(Advanced April 24th)..dis 47½ %
No. 19 to 26 ......" " ..dis 50 %
No. 27 to 36 ......" " ..dis 52½ %
Coppered 0 to 12 ......dis 15 @ 20 %
Tinned Broom Wire ......dis 35 %
Galvanized Wire No. 1 to 18 ......dis 40 %

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.
November 6, 1875.

Augers—Snell Mfg. Co ......dis 25 %
Axes—Francis 11 50
Bits, Auger—Snell Mfg. Co ......dis 25 %
Phœnix ......dis 40 %
Bells, Cow—Yaw's Genuine ......dis 25 %
Braces—Bit, Spofford's Patent ......dis 50 %
Brads, Cut ......dis 50&7½ %
Boards—Stove, Brooks' Pat.dis 35 % 4 mos.: 35&5 % 30 dys
Belting—Rubber ......dis 30 @ 10 %
Leather, new list, oak tanned ......dis 20 %
Brick—Bath (box of 2 doz) Best English $1 25
" Rutherford $1 00
Can Openers—Sprague's ......dis 50 %
Cases—Parlor Coal Hod ......dis 15 %
Chalk—White, Carpenter's ......⅌ gross, 57c
Red, Carpenter's ......" 90c
Chisels—Firmer Socket ......dis 60, 10&10 %
Framing Socket ......dis 60, 10&10 %
Corner Socket Chisels ......dis 60, 10&10 %
Slick's Carpenters' ......dis 60, 10&10 %
Castings—Malleable ......⅌ ℔ 9½c
Cutters—Meat, "Hales" ......35 %
Egg Beaters—"Peerless" ......per doz $3 60
" Centripetal" ......per doz 5 00
Elbows—Corrugated ......dis 10 %
Adjustable ......dis 20 %
Files—Maischoss Bros ......dis 50 %
Fluters—Geneva Hand ......⅌ doz. $15 00
Freezers Ice Cream—"Champion ......dis 33⅓ %
Hammers—Henry W. Kip's ......dis 10 %
Hinges, Gate—Shepard's ......dis 30&10 %
Hinges—Window Blind—
Shepard's and Standard ......dis 60, 10&5 %
Hods, Coal—Plain, Black and Galvan'd...new list dis 15 %
Funnel, Black and Galvanized ......" dis 15 %
Fancy and Helmet ......" dis 15 %
Sad Irons 3½c
Kettles—Brass ......⅌ ℔ 45c
Copper, "Hand Made" ......38c. @ 40c.
Enameled ......dis 50&10 %
Knives, Drawing—Oval No. 1 ......dis 60, 10&10 %
Razor Blade ......dis 60&10 %
Lanterns "Peerless. ....No. 1 5 10
⅌ doz $26 00 $10 50 $13 75 dis 10 %
Tubular $11 00
" with Guards 11 50
Machines—Apple Paring, "Keystone" ......7 75 ⅌ doz
Machines—Boring, Snell's ......dis 20 %
Mills, Coffee—Box and Side, common ......dis 15 %
Box Union and Eagle ......dis 15 %
" American ......dis 15 %
Molasses Gates—"Self Measuring" ......dis 20 %
Nails—Clout and Finishing ......dis 20 %
Shoe ......dis 7½ %
Cut, "Chesapeake," 10d ......dis 7½ %
Horse, Ausable ......No. 5 7 8 9 10 ......$3 10
30 27 25 24 23 22c
" " Pointed & Polished ......add 1c ⅌ ℔
" " 1000 lbs ......dis 5 %
" Clinton ......No. 6 7 8 9 10
21 19 18 17 16c
Packing—Rubber ......dis 30 @ 10 %
Paint—White Lead, U. S. Gov't ......⅌ ℔ 8½c
Pans—Dripping ......⅌ ℔ 10c
Rivets—Iron, Black and Tinned ......dis 25&7½ %
Screws—"American Screw Co"—
Flat Head, Iron ......dis 30 %
Flat Head, Brass ......dis 30 %
Sieves—Wood, Hoop Iron $1 25
Tinned 1 75
Skates and Straps—White's ......dis 30 %
Spoons, Iron Tinned ......dis 10 %
" by the case ......dis 20 %
Plated Rogers' A No. 1 ......dis 50 %
Britannia ......dis 50&10 %
G. S. Hall, Elton & Co ......dis 30&5 %
Squares—Steel and Iron ......new list 50 %
Scales—Buffalo Scale Works ......dis 25 %
Fairbanks ......dis 15 %
Stove Polish—Gem ......⅌ gross, $4 50
" Dixon's ......" 6 00
Tacks—Half Weight Am. Iron ......dis 72½&7½ %
Tea Trays ......dis. 15 %
Tools—Machinists' and Tinmens' ......dis 10 %
Vases—Palace Coal ......dis 15 %
Vises—
Parallel, Buffalo...Old pattern, dis. 30%; new, do.dis 20 %
Ware—French, Tinned and Iron ......dis 20&10 %
Stamped and Japanned ......dis 10 %
Cast Iron Hollow ......dis 40 %
Wire—Bessemer Steel ......dis 10 %
Tin Plates.—Add for each X 2 50

10x14, IC. Charcoal... $9 50	14x20 C. terne	$8 75
12x12. " ... 10 00	20x28 C. "	19 50
12½x17, " ... 9 00	20x28 X. "	24 00
14x20. " ... 10 50		

Pig Tin—Straits ......25c @ 26c
Bar Tin 27c
Solder—No. 1, Crook's ......16 c
Sheet Zinc—
"Lasalle" ......570 100 ℔ casks
$10 50 10 80 ⅌ 100 ℔s
Sheets $10 50
Babbitt Metal ......⅌ ℔ 12c
Iron Wire—Bright and Annealed ......dis 45 %
Coppered ......dis 40 %
Tinned ......dis 25 %
Tinned Broom, { Nos. 20 21 22 } ....dis 35 %
20c 21c 21c
Copper—Sheathing 14 @ 18 oz ......⅌ ℔ 30c
Planished ......⅌ ℔ 37c @ 39c
Bottoms ......⅌ ℔ 32c
Bolts ......⅌ ℔ 31 @ 33c
Braziers' Sheets ......⅌ ℔ 31 @ 33c
Sheet Iron.—
18 Common $4 05
24 Common 4 25
26 Common 4 45
24 W. D. Wood & Co., Smooth Finish 5 25
Planished ......A. 14c B. 11c
Gen. Russia, No. 1 stained 16c
" " clean 15c
Galvanized ......dis 33⅓ %

CINCINNATI.

Reported by Sellew & Co., Importers and Jobbers Metals, No. 214, 216 and 218 Main street.
November 1, 1875.

Tin Plate.—I. C. 10x14 Charcoal ......$9 50 @ 10 00
I. X. 10x14 Charcoal ......12 00 @ 12 50
I. C. Terne 14x20 ......8 75 @ 9 25
I. C. Terne 20x28 ......20 50 @ 22 00
I. C. 20 inches Continuous 21 00
Block Tin.—
Pig ......⅌ ℔ 25c
Bars ......⅌ ℔ 26c
Solder.—
A 1 ......⅌ ℔ 16c
Roofing ......⅌ ℔ 17c
S. & Co ......⅌ ℔ 19c
Lead.—Pig ......⅌ ℔ 7¼c.
Bar ......⅌ ℔ 8½c
Copper.—
Ingot ......⅌ ℔ @ 24c
Planished ......" @ 38c
Sheathing ......" @ 31c
Copper Drops ......" @ 34c
Sheets, 6 to 7 ℔ ......" @ 37c
" 8 to 9 lb ......" @ 35c
" 10 to 12 lb ......" @ 33c
" 13 lb. up ......" @ 31c
Copper Bottoms ......" @ 33c
Zinc. Cask, 500 to 1000 lbs ......⅌ ℔ 10¼ @ 10½c
Case, 100 lbs ......" 10¾ @ 11 c
Slab 7½c
Brass.—Roll, No. 6 to 30 ......⅌ ℔ 30c
Roll, No. 30 to 38 ......" 35c
Wire, No. 0 to 20 ......" 35c
" 20 to 25 ......" 40c
Babbit Metal.—Sellew & Co 35c
Allens' ......" 20c
Market ......" 12c
Antimony ......⅌ ℔ 17c
Bismuth ......⅌ ℔ $4 00
Nickel ......⅌ ℔ $3 50
Russia Iron.—Bundle ......⅌ ℔ 16c
Less than bundle ......⅌ ℔ 18c
No. Stained ......⅌ ℔ 15c @ 16c
Sheet Iron.

	Com. B.	Smooth Fin. S. L. U.	Smooth D Re'fd.
15 to 20	4c	5 10c	7 10
22 to 24	3 30c	5 30c	6 90
26	4c	5 50c	7 05
27	4 20c	5½c	7¼
30	5¼c		

Galvanized Iron.—Full bundles ......dis 30 %
Nos. 18 to 20 ......12c | No. 26 ......14c
22 to 24 ......13c | 27 ......15c
Bar Steel.—Silver, ⅌ ℔ 16c Crescent, 21c.
Iron Wire ......dis 35 %
Enameled Ware ......dis 50 %

One Piece Corrugated Elbows ......dis 10 %

Charcoal Iron.		Russia Iron.	
4½ inch ......⅌ doz	$2 50	4½ inch ......⅌ doz	$5 00
5 " ...... "	3 50	5 " ...... "	7 00
5½ " ...... "	4 50	5½ " ...... "	7 50
6 " ...... "	5 50	6 " ...... "	12 00
7 " ...... "	6 50	7 " ...... "	14 00

Leader Elbows, Flat Crimp Retinned or Galvanized.—Dis. 10 %

	⅌ doz.		⅌ doz.
2 inch	$1 75	2½-inch	$2 75
3-inch	2 25	3½-inch	3 25
4-inch	2 50	4½-inch	3 50

Sheet Iron Bread Pans ......⅌ ℔ 8½c
American Broilers ......⅌ doz. $13 50
Tinmen's Machines ......dis 5 %
Sad Irons.—I X L's ......⅌ ℔, 3½c
Brass Kettles.—Ansonia 45c
Dog Irons ......3 c

PITTSBURGH.

The following are the Card rates of Lewis, Oliver & Phillips, H. B. Newhall, 11 Warren St., New York, Agent.
Iron, standard list assorted sizes, for large orders, specifications to include Bands, small Rounds and Ovals, 2·5c. rate, 2 % off net.
Flat Rail (1¼x¼), punched and coun'sunk..4·1c ⅌ ℔ net
Iron Wedges ......4½c ⅌ ℔ net
Norway Nail Rods ......8½c ⅌ ℔ net
Crow Bars (in ordering please state whether "Wedge" or "Pinch" point) ......4½c ⅌ ℔ net
Beetle Rings ......8 c ⅌ ℔ net
Fence Pickets—
⅜ round, bent to shape, 25c ⅌ ft. of fence, less 15 % off net.
Discount off Standard List.
Carriage and Tire Bolts ......75 % off net
Carriage and Tire Bolts delivered on cars or boats in Pittsburgh.
Stove Bolts ......20 % off net
Machine and Square Head Bolts ......40&10 % off net
Coach and Lag Screws ......40&10 % off net
Bolt Ends ......40 % off net
Pat. Hot Pressed Square and Hexagon Nuts, small sizes, from 3-16 to ⅝ in ......8½c ⅌ ℔ off net
Pat. Hot Pressed Square and Hexagon Nuts, large sizes, from 7-16 to 2 in ......6½c ⅌ ℔ off net
Washers, all made from new band iron, small sizes, from 3-16 to ⅝ in ......9½c ⅌ ℔ off net
Washers, all made from new band iron, large sizes, from 7-16 to 1½ in ......7½c ⅌ ℔ off net
Nuts and Washers in 25 lb. boxes, ½c ⅌ ℔ ex. Nuts and Washers in lots less than one keg each size, ½c ⅌ ℔ ex. Nuts and Washers in 5 lb. boxes, 1c. ⅌ ℔ ex. net prices.
Standard Caps, for Plows ......5½c. ⅌ ℔ net
Iron Harrow Teeth, in lots of 1 ton or more, packed in 200 lb. boxes, 1 in. diam. 3¼c ⅌ ℔ net; ⅞, ¾ in. diam. 3½c ⅌ ℔ net; ⅝ in. diam. 3¾c ⅌ ℔ net.
Patent Headed Harrow Teeth, packed in boxes ½c ⅌ ℔ ex
Skein Bolts, in bulk, in lots of 1 keg or more, ⅝ in. diam. 5c ⅌ ℔ net; 9-16 in. diam. 6c ⅌ ℔ net; ½ in. diam. 7c ⅌ ℔ net. 1c ⅌ ℔ extra when less than 1 keg of each size is ordered.
Strap & T Hinges...33⅓&10 % off net, delivery as custo'ry
Screw Hitching Rings ......$5 25 ⅌ 100 net
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long ......⅌ ℔ 3½c net
1 to 2 in. diam. from 4 to 8 ft. long ......" 4 c net
1 to 2 in. diam. from 1½ to 4 ft. long ......" 4½c net
⅝, ¾ and ⅞ in. diam. over 4 ft. long ......" 4½c net
⅝, ¾ and ⅞ in. diam. from 1½ to 4 ft. long " 5 c net
Bridge bolts with upset ends ......¾c. ⅌ ℔ extra
Wrought iron plates, punched ......4½c. ⅌ ℔ net
Cast Iron Washers ......⅌ ℔ 3½c net
Duck Nest Tuyere Irons ......$14 50 ⅌ doz net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ⅌ set of 8 bolts.. 45c

12	"	½	"	"	8 " ..	55c
10	"	9-16	"	"	8 " ..	65c
12	"	9-16	"	"	8 " ..	70c
14	"	9-16	"	"	8 " ..	80c
10	"	⅝	"	"	8 " ..	80c
12	"	⅝	"	"	8 " ..	80c
14	"	⅝	"	"	8 " ..	90c
16	"	⅝	"	"	8 " ..	1 00
18	"	⅝	"	"	8 " ..	1 10
20	"	⅝	"	"	8 " ..	1 20

5c ⅌ set for each additional inch over 14 in All lengths made.
In ordering Box Strap Bolts please give diameter at Screw End.
Wagon Box Rods, narrow track, each 15c
" " wide track, each 17c
Single Tree Irons, ⅌ set of four pieces 30c
Wrought Iron Bolster Plates, 2¾ in. wide, ⅌ set 45c
" " 3 " " 50c
" " 3¼ " " 55c
" " 3½ " " 60c
Wagon Brake Ratchets, each ......14 c
" " " finished with guard, each..40 c
Wrought Hammer Straps, heavy pattern, each ......18 c
" " " light " each ......12 c
" Rub Irons, each ......9 c
Stay Chain Hooks, each 5½c
Double and Single Tree Clips, figure 1, each ......8 c
" " " " 2, each ......9 c
" " " " 3, each ......11 c
Axle Clips, Round Part ⅝, Flat Part 1¼, each 8c
Wagon Clevis, including Pin, complete, each 10c
Pole Caps, each 24c
Single Tree Hooks, Nos. 1 and 2 ......4½c
Strap Bolts, Rods, Single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks, Clevis and Pin, Clips, Single Tree Hooks, and Pole Caps, in lots of 50 sets ......dis 15 %
Wagon Box Staples, 1½ to 2¼ in. to clinch. ⅌ 1000 $11 00 net
" " " Bevel Box Iron, to rivet on. ⅌ 1000 7 50 net
Neck Yoke Eyes, each ......4½c net
" " with ⅜ rings, each ......7½c net
King Bolts, ⅞, 1, 1⅛, and 1¼ in. diam ......⅌ ℔ 4½c net
Wagon Rivets, ex. large, flat, oval and steeple head, ¼ in. diam. all lengths ......" 8½c net
Wagon Rivets, 3-16 in. diam., all lengths ......" 9½c net
" ¾ to 1 inch long ......⅌ ℔ 1c extra
" & Nails, in 5 ℔ paper boxes ......" 1c extra
" " in 25 ℔ wood " ......" ½c extra
Wagon and Hinge Nails, ¼ in ......⅌ ℔ 17 c net
" " " 3-16 in ......" 19 c net
Wagon Rivets and Nails, in less lots than one keg each size ......" ½c extra
Double Tree Plates ......" 8c net
Coupling " ......" 5c net
Tongue " ......" 8½c net
Neck Yoke Plates ......" 10½c net
Tongue Cap Iron, 1¾, 2 & 2¼ in. wide, same price ⅌ ℔ as Band Iron.
Wagon Chains, Stay, Lock and Tongue, 5-16 in, ⅌ ℔ 10½c net. ¼ in., 11½c. net
Above prices are free on board cars in Pittsburgh. Subject to change of market, without notice.

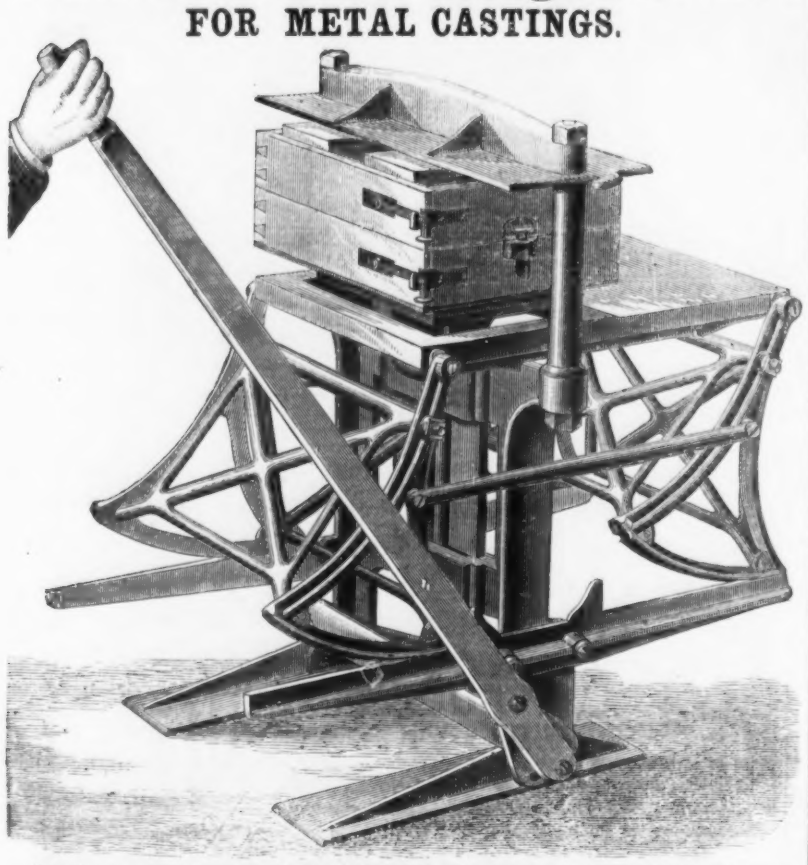
DETROIT.

(Reported by Messrs. Jewett & Root.)
Nov. 8, 1875.

Tin Plate.—Best Charcoal
IC. 10x14 ......$ 9 75
IX. 10x14 ......12 25
XX. 10x14 ......14 75
IC. 12x12 ......10 25
IX. 12x12 ......12 75
IC. 14x20 ......10 75
IX. 14x20 ......13 25
XX. 14x20 ......15 75
XXX. 14x20 ......18 25
XXXX. 14x20 ......20 75
DC. 100 Plate 9 25
DX. " 11 75
DXX. " 14 25
DXXX " 16 75
DXXXX 100 Plate 19 25
IX. 14x14 ......19 25
IC. 10x14 W 9 25
IX. 10x14 W 11 75
Roofing Tin.—Best Char.
IC. Terne, 14x20 ......$ 9 00
IX. " 14x20 ......11 50
IC. Terne, 20x28 ......19 00
IX. " 20x28 ......24 00
Coke Tin.—
IC. 10x14 Coke ......$ 9 00
IX. 10x14, Coke 11 50
IC. 14x20, " 10 00
Solder.—No. 1 ......16c
No. 2 ......15c
Pig Tin.—
Large Pigs 24c
Small Pigs 25c
Bars 26c
Bright Wire.
63 lbs. in bdl ......dis —
Copper.—
Sheathing 31c
Copper Bottoms 32c
Planished Copper.—
Sheathing, 14x48 ......38c
Boiler Size, No. 7 ......40c
" " No. 8 ......40c
" " No. 9 ......40c
Sheet Iron.—
No. 18 Am. Com 4 00
No. 24 Am. Com 4 20
No. 26 Am. Com 4 40
No. 27, Am. Com 4 60
W. D. WOOD'S & CO.'S SHEET IRON.—
Nos. 15 to 20 Smooth $5 00
" 21 to 24 ......5 20
" 25 & 26 ......5 40
" 21 to 24 Char'l 6 70
" 25 & 26 " 6 90
RUSSIA.
Genuine 17c
Imitation 14c

Eames' Pat. Molding Machine

FOR METAL CASTINGS.



The above machines have recently been introduced in several large iron foundries in this country, where they have given entire satisfaction. Among the advantages are:

1st. A great saving in the cost of producing castings.

2d. A man can learn to mold with the machine in less than 30 days' time.

3d. The castings produced will be found more perfect, less poor work, and more uniform than if molded by the old method.

The machine is adapted for either Iron or Brass Castings. *Price Reduced.* For further particulars, send for Circular. Address,

P. & F. CORBIN,

EXCLUSIVE LICENSES,

Also Manufacturers of *Architectural Bronze Work, Locks, Hinges and fine Builders' Hardware generally.*

New Britain, Conn. New York, 87 Chambers St.

Armstrong & Hutchinson,

Manufacturers of

PATENT STOP GATES

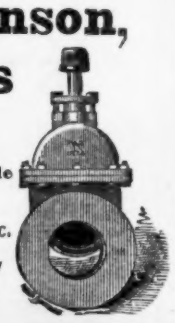
For Water, Gas and Steam,

From 2 in. to 50 in. diameter.

Also, **Fire Hydrants, Single and Double Nozzle.**

Improved Boiler Feeders, Etc.

Cor. Park Way & Sandusky Sts., ALLEGHENY, PA.



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Pressure Blowers, Fan Blowers and Exhaust Fans.

10,000 SOLD IN SIX YEARS.

SEND FOR ILLUSTRATED CATALOGUE.

B. F. STURTEVANT, 72 Sudbury Street,

BOSTON, MASS.

CENTENNIAL

SELF-LUBRICATIVE

Hemp Piston Packing

FOR

Locomotives, Steamships, Stationary Engines, Hot or Cold Water Pumps.

Recommended by Master Mechanics and Engineers, as the cheapest and best in market. **No more Extortionate Prices. No more Fluted Rods**—but a good article at fair price.

JOHN CANFIELD & CO.,

SOLE MANUFACTURERS,

Office, 1321 Fairmount Ave., Phila.

PATENT APPLIED FOR. Send for Circular.

GOLD MEDAL

Non-Extensible Razor Belt.

PATENTED JULY 25, 1871.

RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap the liability of the leather to stretch and become loose and porous is prevented by the a patented non-extensible base, which supports the leather and secures

PERMANENT ELASTICITY.

We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality compare favorably with our other well known brands.

BENJAMIN F. BADGER, Manufacturer,

Badger Place, Charlestown, Mass.

BILLINGS & SPENCER CO.

MANUFACTURERS OF

CLAMP, DIE AND COMMON

LATHE DOGS.

Vienna, 1873

Forged from Bar Steel *And Hardened*

Under Billing's Patent Process.

For Progress.

FIRST CLASS ARTICLES,

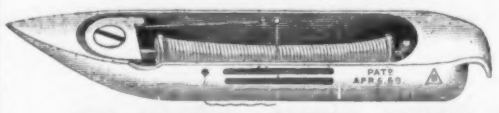
and something that every machinist and Tool Maker will appreciate.

Also, all Descriptions of **Wrought Iron & Steel**

DROP FORGINGS.

For Machine Handles, Lathe Wrenches, Spinning Rings, Marlin Spikes, Clinch Rings, Thumb Screws, Thumb Nuts, and Parts of Drill Chucks, Sewing Machines, Guns, Pistols, and

Machinery Generally.



TRADE B MARK.

THE BILLINGS PATENT SEWING MACHINE SHUTTLE,

Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,

Barwick **Wheatcroft**

Patent Self-Adjusting PIPE WRENCHES, of all sizes.

Illustrated Circulars and Price List sent to any order on request. **Lawrence St., Hartford, Conn.**

AMERICAN TWIST DRILL CO.,

Woonsocket, - - RHODE ISLAND.

Sole Manufacturers of the celebrated

Fast Cutting—Free from Glazing—It is the best Solid Emery Wheel.

Diamond Solid Emery Wheel

Prices: 10x1, $2·90; 14x2, $9·75; 18x2½, $20·00; 24x3, $42·00. All other sizes at proportionate prices. State diameter of Holes in your orders for Wheels.

MANUFACTURERS OF

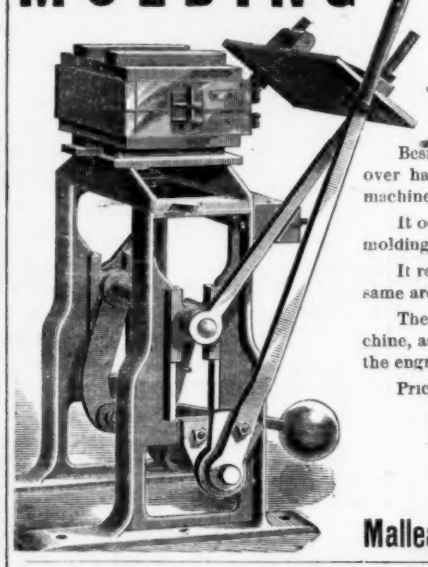
PATENT EMERY WHEEL MACHINERY,

And Automatic Knife Grinders

For the rapid and perfect grinding of Planer, Paper Cutting, Leather Splitting and other long Knives.

These goods are unsurpassed for elegance of design, workmanship, capacity and durability. First premium awarded by American Institute, N. Y., 1870 and '73; Medal and Diploma by M. C. M. A., Boston, 1874.

MOLDING MACHINE,



New and Improved.

T. F. HAMMER'S PATENT.

Beside all advantages Molding Machines possess over hand molding, it is especially claimed for this machine, that:

It occupies no more room than a bench for hand molding.

It requires no special flasks or boards, but the same are used as for hand molding.

The light is not obstructed by any part of the machine, as the pressure plate is swung back as shown in the engraving.

Price List on application.

T. F. HAMMER,

Branford, Conn.

Malleable Iron Castings made to Order.

Two First Premiums awarded by Franklin Institute Exhibition of 1874.

C. VAN HAAGEN & CO.,

2341 and 2343 Callowhill Street, PHILADELPHIA, PA.

Manufacturers of Latest Improved Machine Tools, Rotary Shapers, two sizes, Iron Planers, all sizes, Horizontal Drill Attachments, for upright power drills, Self-feeding Portable Drills, hand or power, Expansion Boring Bars, five sizes, Universal Slide Rest, for taper work, Twist Drill Sharpening Machines, automatic and adjustable in every direction, Noiseless Friction Gears, for transmitting up to thirty horse-power.

Send for Descriptive Circulars.

BUSH HILL IRON WORKS,

Corner 16th & Buttonwood Streets

PHILADELPHIA.

JAMES MOORE,

(Successor to MATTHEWS & MOORE,)

Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or Composition Metals.

Sugar Mill, Saw Mill and Grist Mill Machinery,

AND MILLWRIGHTING IN GENERAL.

BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of

TANK AND PLATE IRON WORK.

CLARK TOMPKINS

Manufacturer and Patentee of

UPRIGHT ROTARY

Knitting Machines,

Cone Winders for Hosiery Yarns,

NAPPERS FOR HOSIERY GOODS,

Stop Motions & Alarms for Knitting Machines,

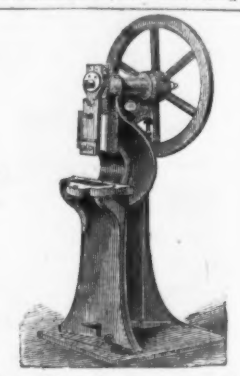
Flock Cutters, and Flock Renovators.

EXTRA PARTS FURNISHED PROMPTLY.

☞ I am also prepared to furnish anything in the line of Gear Cutting from 5½ feet to ⅛ of an inch in diameter, any shape of tooth desired; Racks, Worms, Worm Wheels, Screws any size or number of threads to the inch, Wood Planing, Iron Planing, Large Lathe Work, Gear Cogging, Shafts, Hangings and Pulleys, also all kinds of Mill Work, Jobbing, and Machinery in general.

Shop, Foot of Cypress St., Troy, N. Y.

Particular attention paid to Experimental Machinery. We aim to maintain our reputation for doing work well.



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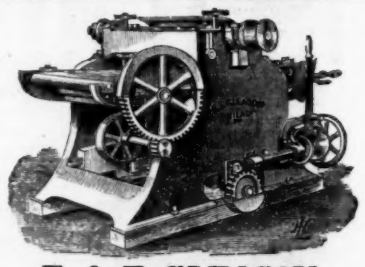

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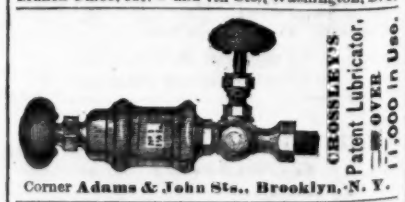


Corner **Adams & John Sts., Brooklyn, N. Y.**

HOLSKE MACHINE CO.,

279 Cherry St., near Jefferson St.

ELEVATORS

For Hotels & Stores a specialty.

Machinery in General made to order.

BOSTON.

(Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.)

Anvils.—"Eagle American"........per lb. 10c; dis 20 %
Augers.—Watrous Ship........dis 10 %
L'Hommedieu Ship........dis 15 %
Axes.—Forester's Favorite, Bronzed........$11 50
Blue Jackets, Blue........11 00
Excelsior, Black........10 50
Chopper's Pride, Bronzed........10 50
Red Cross, Red........9 00
Red Cross, Handled........12 00
Boy's Handled Blue Jackets........11 00
Axe Handles.—Wadleigh's Oak—
A (Extra) $2·50. B (No. 1) $2·00. C (No. 2) $1·50 ℔ doz
Bells, Sleigh—
Fancy Body, Patent Leather, Cloth Bound, White Metal, 30, No. 1........$1·70
Fancy Body, Patent Leather, Cloth Bound, White Metal, 36, No. 1........1·80
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, 30, No. 1........·38
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, 36, No. 1........2·50
Fancy Body, Patent Leather, Leather Bound, Silver Plated, 30, No. 1........3·38
Fancy Body, Patent Leather, Leather Bound, Silver Plated, 36, No. 1........3·50
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1........per pair, 50c.
Common, 6, No. 1........" 45c.
Blind Hinges.—
Orr or Washburn's........per hundred sets $9 50
Blind Fasts.—
Orr or Washburn's........per hundred set $6 00
Bolts.—Carriage, Phila., "Girard Works....dis 50&10 %
Borax.—Best Refined........℔ 15c
Borers.—Angle, Backus'........dis 30 %
Boring Machines.—Angle........each $4 75
Common, Snell's quality........each 3 75
Braces.—Barber's........dis 40&5 %
Backus'........dis 50 %
Spofford's........dis 50 %
Amidon........dis 50 %
Brackets.—Star Bronzed........new list net
Star Japanned........new list net
Store Shelf........new list net
Brass Faucets.—L. F. & C........dis 25&10 %
Brushes.—Horse, Patent Metallic........per doz. $4·50
Butts.—Union Drilled Loose Joint........dis 45&10 %
" " Wire Fast Joint........dis 25&10 %
" " Acorn Loose Joint...dis 45&10 %
Brass Butts........dis 30 %
Wrought Table Butts and Back Flaps........revised list, dis 30 %
Wrought Narrow Butts........reduced, dis 30 %
Can Openers.—Sprague's........dis 50 %
No. 1, Iron Handle........$4·00
No. 2, Wood Handle........4·50
Cards.—
Curry Cards, No. X, per doz., $0·35........dis 30 %
Horse " No. X, " 0·80........dis 30 %
Wool " No. 8X, " 2·50........dis 15 %
Cotton " No. 10, " 3·50........dis 10 %
Cartridges.—U. S. Cartridge Co........dis 60 %
Chisels.—"Buck Bros.' Shank Goods........add 22½ %
Socket........add 25 %
Churns.—Lightning—
Redheffer patent........3, 4, 5, 6 gall per doz $22 00, $27 00, $31 50, $36 00
Coal Hods........dis 40 %
Fancy Japanned, No. 4, 15 in., $8·00; 5, 16 in., $9·00; 6, 17 in., $10·00.
Fancy Galvanized, No. 4, 15 in., $11·50; 5, 16 in., $13·00; 6, 17 in., $14·00.
Perfection, Jap'd, No. 4, 15 in., $12·00; 5, 16 in., $13·00; 6, 17 in., $14·00.
Perfection, Galv'd, No. 4, 15 in., $15·00; 5, 16 in., $16·00; 6, 17 in., $17·00.
Morning Glory, Jap'd, No. 4, 15 in., $12·00; 5, 16 in., $13·00; 6, 17 in., $14·00.
Morning Glory, Galv'd, No. 4, 15 in., $15·00; No. 5, 16 in., $16·00; No. 6, 17 in., $17·00.
Compasses and Dividers.—Bemis'........dis 40 %
P. S. & W........dis 30 %
Cordage.—Manila (usual trade dis.)........℔ 14½c
American Tarred Hemp Lath Yarn........℔ 10c
Corn Hooks........per doz $2·75
Cow Ties........dis 10 %

No. 30, Open Ring, 3 foot,	No. 6,	with Toggle			$3·70
No. 35, "	3 "	No. 6,	"	Snap	3·90
No. 40, "	3½ "	No. 6,	"	Toggle	4·00
No. 45, "	3½ "	No. 6,	"	Snap	4·30
No. 50, "	4 "	No. 5,	"	Toggle	4·70
No. 55, "	4 "	No. 5,	"	Snap	4·80
No. 60, "	4½ "	No. 4,	"	Toggle	5·20
No. 65, "	4½ "	No. 4,	"	Snap	5·40

Crow Bars.—Iron, Steel Points........℔ 5¼c
"Sweet" Steel Bars........℔ 11c
Brown's Steel Bars........℔ 10c
K. P. & Co. Extra Drill Steel........℔ 15c
Dividers.—Cook's Nickel Plated........dis 15 %
Door Springs.—Moseley—

Per doz	$9·00	12·00	15·00	18·00	24·00
No.	0	1	2	3	4

Torrey's........$3·00
Gem........1, $3 50; 2, $2 50; 3, $2 00 ℔ doz
Egg Beaters.—Lightning, Redheffer pat., pints, $5 50; 1 qt., $8 00; 2 qts., $12 00 per doz.
Emery.—Alden........℔ 6½c
Wellington Mills........℔ 10c
Files.—Earl Smith & Co.'s English........$5 to £ gold
American........$5 to £ currency, less 15 %
Nicholson........new net list
Wheeler, Madden & Clemson........$5 to £
Stubb's Tapers, genuine, 3 in., $1·50; 3½, $1·62; 4, $1·88; 4½, $2·18; 5, $2·50.
Funnel Irons.—$2·50, 2·50, 2·50, 3·25 per doz; 5, 5½, 6, 7 inch.
Deep Flange.—$3·50, 3·75, 4·00; 5, 5½, 6 inch.
Hammers.—Maydole........dis 12 %
M., B. & D., solid cast steel, adze eye, No. 1, $10; 1½, $8·75 " " " " " bell face, No. 1, $11; 1½, $9·75.
Hangers & Rollers.—Novelty........dis 30 %
Anti-Friction........dis 30&5 %

Hatchets.—Underhill Edge Tool Co........dis 15 %
C. F. Dowse, warranted Cast Steel—
Shingling........0, $4·75; 1, $5·25; 2, $5·75
Claw........1, 5·75; 2, 6·25
Lathing........1, $5·50
Axe Pattern........1, $7·00; 2, 7·50
Broad....0, $5·75; 1, $6·50; 2, $7·50; 3, $9·25; 4, $10·75; 5, $12·75; 6, $14·75
Hinges.—Strap and T, Stanley Works........dis 40 %
Plate, Loose and Fast Joint........℔ 6c
Wrought Screw Hook........℔ 6½c
Knobs.—Young's Imp. Silver'd Glass........dis 45 %
Lanterns.—Tubular No. 0........$ 9·50
Guarded, No. 74, (with kerosene oil and candle burners)........5·50
Anti-Tubular........8·00
Lead.—Sheet, 9½c.; Pipe, 9c........less 10 %
Locks.—Norwalk Lock Co......reduced list, dis 40&5 %
Mattocks.—
K. P. & Co., axe finish, long cutter........$13 00—net
Short cutter........12 75—net
Meat Cutters.—"Miles's" Challenge........dis. 20 %
No. 1, $22·00; 2, $30·00; 3, $40·00.
Metal.—Babbitt, No. 1, 35c; 2, 25c; 3, 16c; 4, 15c ℔
Nails.—10d and larger........$3 25 net
Nail Pullers.—Little Giant—Small.....per doz., $22·00
Little Giant—Large........" 30·00
Padlocks.—Wilcox........reduced list, dis 40&5 %
All Brass, 2½ inch, 2 keys, job lot........$9 00
Paper.—Tar'd Sheathing........℔ 2 c
Dry Sheathing........" 3 c
" " "Beaver Brand" Rosin Sized.. " 3½c
Tar'd " " "........" 3 c
Felt " " "........" 4½c
Virginia Cane Fibre........4½c
Picks.—K. P. & Co., Solid Eyes........5 to 6, 6 to 7; $9 00, $9 50
Pins.—Universal Hat and Coat all wood—
2 in........℔ gross $2 50; 3 in., 3 50; 4 in., 4 50—dis 15 %
Potato Digger.—
"Partridge," 6 square tine........℔ doz $12 00
Shumway & Co., 6 round tine........℔ doz 9 00
Pulleys.—Axle.
Frame Pol. Wheel....No. 150, 20c., 1¼ in.; 16, 38c., 2 in.
Common Axle........No. 18, 34c., 1¾ in.; 26, 40c., 2 in.
Milled Axle........No. 2, 42c., 1¾ in.; 2, 50c., 2 in.
Nashua Pat. Axle Bronzed Face...1¾ in., 80c; 2 in., 90c
Cast Steel Axle........2 in., $1·00
Pulley Blocks.—"Best Boston Make"........net
Common Strapped Blocks—

	4	5	6	7 inch.
Single,	75c.	88c.	$1·00	$1·13 each.
Double,	$1·00	1·12	1·25	1·60 "

Inside Iron Strapped Blocks—

	5	6	7			10 inch.
Single,	$1·00	1·13	1·88	2·00	2·25	2·75 each.
Double,	1·88	2·30	2·68	3·63	4·00	5·00 "

Inside Iron Strapped Blocks, with Patent Roller Bushings—

	5	6	7	8	9	10 inch.
Single,	$1·25	1·50	1·65	2·50	2·75	3 50 each.
Double,	2·50	3·00	3·38	4·63	5·00	6·50 "

Plated Ware.—Rogers Bros........dis 50 %
Plumb & Levels.—"Davis" Pat. Adjustable—
No. 1, Iron and Wood Center Levels........dis 50 %
No. 2, First Quality Levels........dis 60&10 %
No. 3, Iron Pocket "........dis 35 %
No. 4, Level and Plumb Glasses........dis 60&10 %
No. 5, Iron Pocket Levels, per square and straight edge........dis 50&10 %
No. 6, Improved Iron Bench Planes........dis 20&10 %
Pocket Knives.—Conn. Cutlery Co........new net list
American Shear Co........new net list
Rail Barn Door.—For Novelty and Anti-Friction Hangers........per foot 7c.. dis 30 %
Rivets.—Black........dis 50 %
Carriage, oval head, Nos. 3, 4, 5, 6, 7, 8. dis 35 %; 13, 13, 14, 14, 15, 16c ℔
Rubber Moldings.—"Harmon's"........dis 10 %
No. 2, for Windows........per foot, 5c
No. 3, for Doors........per foot, 10c
No. 4, "........per foot, 12c
Miller's Patent........per foot, 4½c
Sad Irons.—Bless & Drake........℔ 4c
Sand Paper—0 to 2, $4·25; 2 to 3, $4·75........dis 10 %
Saws.—*Hand and Panel*—
Wheeler, Madden & Clemson's, same list as "Disston's"........dis. 15&5 %
Disston's........dis. 12½ %
Cross Cut—
Wheeler, Madden & Clemson X Cuts........per ft., 37c
" " " "Star" X Cuts. " 80c
" " " Champion X Cut. " 50c
" " " One Man X Cut..each, $2·25
Boynton's genuine Lightning X Cut........per ft., 50c
" " " One Man X Cut..each, $2·00
Circular—Wheeler, Madden & Clemson's........dis. 25 %
Mill— " " "........dis. 25 %
Screws.—Am. Screw Co., new list Sept. 1st....dis 40 %
Aiken's........dis 40 %
Scythe Stones.—
"Willoughby Lake," first quality........℔ gross $6·50
" " second quality........" 3·00
Shovels.—O. Ames........dis 20 %
M. B. & D........dis 20 %
Snow, Malleable Iron Tip, D Handle—Agents for New England........$6·50
Snow, Malleable Iron Tip, long Handle—Agents for New England........5·50
Sifters.—Coal, Rice, &c........$12 00
Spading Forks.—M. & E........dis 25 %
Stone Pickers.—"Partridge," original....℔ doz $15 00
Tools.—Aiken's Pattern, 20 in set; Parr's..$17 50 per doz
Traps.—Oneida........dis 25 %
Blake's........dis 50 %
Vises.—K. P. & Co.'s Solid Box, Blacksmith.....℔ 13c
Parker's Parallel........dis 10 %
Backus........dis 25 %
"Howards," Parallel........dis 20 %
Wardrobe Hooks.—Wire to drive........℔ gross $1 00
Weather Strips.—"Harmon's"....per doz $5, dis 10 %
Weights.—Window Weights........℔ 2c
Wedges—Axe........℔ doz 38c
Wire.—
Eureka, in spools, No. 28 to 40 assorted...℔ gross $3 50
Wire Netting.—Clinton Wire Cloth Co., Green, Drab or Black........℔ ft 5½c
Wrenches.—Genuine Wrenches, G. A. Coes..dis 40&5 %
Walton........dis 50 %
Wringers.—
Novelty and Universal } Tub No. 2 { ......Less than doz, $72 00; ......2 doz or more, 70 00
Bench A... less than 2 doz $86 00; 2 doz or more $84 00
" B... " " 94 00 " " 92 00
" C... " " 110 00 " " 107 00
Eureka..... " " 60 00 " " 58 00
Withington, Cooley & Co.—
Hoes, Rakes, Forks, &c........dis 33⅓ %

Boston Metal Market.

(Corrected by Fuller, Dana & Fitz, 110 North Street, Boston, Importers and Commission Merchants.)
December 18, 1875.

Iron.—Best Refined Bar Iron........℔ ton $52 50
"Burden Best" " " ...." 96 00
Swedish Bar Iron........gold " 110 00
Norway Shapes........gold " 122 50
Norway Nail Rods........gold " 130 00
Sheet Iron, American........℔ 4½c
" " Galvanized........" 9 c
" " Russian........gold " 18¾c
Plate Iron, C. No. 1........3½c
Iron Rails........℔ ton $47 50
Steel Rails........" 72 50
Pig Iron, Foundry, No. 1 extra........" 25 50
" " No. 2 extra........" 28 50
" Gray Forge........" 21 50
" Scotch........" 30 00 @ 32 00
Wrought Scrap Iron........" 31 00
Old Rails........" 28 00

Steel.—	℔	German ....℔	9 c
Eng. Tool, gold	15½c	Spring	8 c
American Tool	14½c	Tire	6 c
" Mach	9 c	Sleigh Shoe	4½c
Bessemer	7 c	Toe Calk	7½c
Tin Plates.—℔ box gold		**Copper.**—	℔
I. C. Char. 10x14	$7·75	Ingot	23½c
I. C. Coke 10x14	[illegible] 00	Bolt	30c
Char. Roof. IC, 14x20,	7 25	Sheathing	30c
Coke " IC, 14x20,	6 25	**Lead.**—	℔
METALS.		Pig	7½c
Pig Tin.— ℔., gold		Sheet & Pipe	8 1-10c
Banca	21c	**Zinc.**—Sheet..℔	10½c
Straits	19¾c	**Spelter.**........℔	7½c
English	19½c	**Antimony.** gold ℔	18½c

ST. LOUIS.

Corrected weekly by Semple, Birge & Co.

Apple Parers.—Conqueror........℔ doz, $7 75
Hudson's Rotary........" 7 75
Axes.—Wm. Mann's, Red Warrior........℔ doz $11 50
Wm. Mann's, W. Stewart's........" 11 00
" C Marshall........" 10 50
" Handled........$5 extra
" Double Bitted........" 2. 50
H. L. B. & Co.'s, L. & Co........" 11 50
" Pioneer........" 12 00
" James & Co........" 11 00
Hunt's........" 13 00
Axles.—"Jones, Henry & Co.'s" Patent Lubricating, Half Patent, Swelled Taper, Plain Taper and Concord Axles........dis 10 & 5 %
Common Axles (Pat. Lubricating), 1½ inch and upward........℔ 6½c.
do. less than 1½ inch........" 7 c.
Bellows.—Best St. Louis make..60c ℔ in. dis 20&2½ %
Bells.—Troy, Church, School and Farm Bells..℔ 40c
"Improved Amalgam Bronzed," 15 in., $1·90; 17 in., $2·50; 19 in., $3·75; 21 in., $5·00........net
Belting.—"Boston Belting Co.'s Rubber........dis 40 %
"Bradford & Sharp's" Oak-Tanned Leather........dis 30 %
Bolts.—Arms, Bell & Co.'s Carriage & Tire..dis 70&10 %
Arms, Bell & Co.'s Machine........dis 30&10 %
Butts.—Western Butt Co.'s new list—
Narrow Fast Joint........dis 25&10 %
Broad Fast Joint........dis 3 &10 %
" Loose "........dis 45&10 %
Reversible........dis 40&10 %
" Japanned and Silver Tipped........dis 45&10 %
Loose Joint "Acorn" " "........dis 45&10 %
Wheeling Hinge Co.'s W't Fast Joint Nar........dis 30 %
" " " Broad........dis 35 %
" " " Loose Joint........dis 35 %
" " " Reversible........dis 35 %
" " " Table & B'k Flaps........30 %
Churns.—Julian, No. 2, $7·00; No. 3, $7·50; No. 4, $8·50........dis 25 %
Cider Mills.
American Senior, $40·00; Am Junior, $25·00....dis 20 %
Corn Drill.—Campbell's Patent........each $[illegible]
Corn Knives.—Dunn Edge Tool Co.'s Clip....℔ doz 5 00
Seymour Mfg. Co.'s Solid Steel Back........" 4 00
Corn Shellers.—Sandwich Mfg. Co.'s—
Power Shellers........dis 10 %
Hand Shellers........Special rates
Cotton Gins.—The Carver, 10 in. Saw, $4 a Saw..dis 15 %
12 in. Saw, $4·50 a Saw........dis 10 %
Crow Bars.—Steel Pointed........℔ 6½c
Drag Saw Machines.—
Culver's Iron Drag Saw........dis 10 %
Robinson's Patent Sweepstakes Drag Saw........dis 10 %

Fanning Mills.—Nash & Cutt's........dis 20 %
Feed Cutters.—Improved Burdick National...dis 20 %
Sanford No. 1, $10 75; No. 2, $8 00........net
Files.—Black Diamond, Mill........$5·00 £ currency.
" Bastard........5·00 £ currency.
" Taper........5·00 £ currency.
Forges.—Keystone Portable Forge Co.'s......dis 12½ %
Forks and Hoes.—
Auburn Mfg. Co.'s Hay and Manure Forks......dis 10 %
" Handled Hoes........dis 30 %
Garden Seed Drills and Wheel Hoes.
Allen's Double Wheel Hoe........dis 5 %
" Planet Drill, Nos. 2 and 3........dis 15 %
" Combined Drill and Wheel Hoe........dis 15 %
Grinding Mills.—Challenge Feed Mills........dis 15 %
Sedgebeer's Nonpareil Mills........dis 15 %
Hammers.—Masons' Hammers........℔ 22c
Smiths' Hand........20c
Handles.—No. 1 Fork, Hoe and Rake........dis 20 %
No. 2 Fork, Hoe and Rake........dis 40 %
Harrow Teeth.—1 inch iron........℔ 4½c
⅞ and ¾ inch iron........4½c
Barbed or Headed........½c extra
Hay and Cotton Presses.—
Dederick's Railroad........net list
" Perpetual........net list
Hay Knives.—
Dunn Edge Tool Co.'s........℔ doz $15 00—dis 15&5 %
Lightning (Weymouth's Patent)........℔ doz $20 50
Hinges.—
Wheeling Hinge Co.'s Strap & T........dis 33⅓&10 %
Horse Hay Fork.—Nellis' Harpoon........dis 25 %
Horse Nails.—National Patent Pointed........20c rates
National Patent Pointed, extra finished........22c "
Horse Powers.—Pitts or Carey's Patent........dis 10 %
Wheeler's Railway........dis 10 %
Sandwich Lever........dis 10 %
Horse Rasps.—Heller Bros........dis 45 %
"Black Diamond"........$6·00 to the £ currency
Horse Shoes.—
Rhode Island (Perkin's Pattern)........℔ keg, $5 50
" Mule........" 6 50
" Trotting Shoes........" 8 00
Tredegar Horse........per keg $5 50
" Mule........per keg 6 50
Hose.—
Boston Belting Co.'s Rubber Medium Sizes, dis 30&10 %
" " " Small Sizes, Hydrant........dis 40 %
Ice Tools.—W. T. Wood & Co.'s Saws........new list net
W. T. Wood & Co.'s Chest Hatchets........new list net
" " Axes........new list net
" " Loading Tongs........new list net
" " Medium, Small and Family Tongs........new list net
" " Chisels, Hooks and Grapples........new list net
Mattocks and Grub Hoes.—
Klein, Logan & Co.'s Mattocks....℔ doz $13 00 @ 13 50
" " Grub Hoes, oval eye........" 10 00 @ 11 50
Money Drawers.—
Pierpont & Co.'s Excelsior........per doz $40·00 net
Nails.—Wheeling Riverside Brand........$5·00 rates
Packing.—Boston Belting Co.'s Rubber, Plain..dis 30 %
Boston Belting Co.'s Rubber, Pure........dis 25&5 %
" " No. 2 Plain........dis 40 %
" " Round and Square....dis 10&10 %
Picks.—Klein, Logan & Co.'s Railroad and Clay........℔ doz $9 30 @ 11 00
Klein, Logan & Co.'s Coal........" 7 45 @ 8 40
" " Poll........" 12 00 @ 15 50
" " Stone........" 14 40 @ 14 90
" " Tamping........" 14 75 @ 15 35
" " Miners' Drifting........" 10 25 @ 12 80
Plows.—Avery's Cast and Steel........dis 20 %
Collins Cast Cast Steel........new list net
Pekin Steel........new list dis 15 %
Post Hole Augers.—Clark's Patent—
No. 1, ℔ doz. $27; No. 2, $30; No. 3, $32........dis 20 %
Pulleys.—5 inch........per doz $4·25 net
4 inch........per doz 3·25 net
Nellis' Patent........new list dis 15 %
Pumps.
St. Louis, Farm, Patent Metal Lined...new list dis 50 %
Rakes.—Paddock's Premium Sulky........$28 00 net
St. Louis Revolving 14 tooth........5 00 net
" " 16 "........5 25 net
" Hand Hay Rake........dis 20 %
Reaper Knives and Sections.—
Geo. Barnes & Co.'s Knives........dis 25 %
" " Sections........dis 40 %
Road Scrapers.—Steel........dis 25 %
Cast Iron........dis 10&5 %
Sad Irons.—Monitor Brand, Silver Polished..℔ 4½c
Sash Weights.—Standard Solid Eyes........℔ 4c
Saws.—Curtis & Co........dis 10 %
Scythes.—Dunn Edge Tool Co.'s........dis 30 %
Scythe Stones.—No. 1 Ind'n Pond ℔ gr's, $7 00
Extra Indian Pond........" 7 50
Premium........" 10 50 } dis 25 %
Diamond Grit........" 13 00
Shovels and Spades.—H. M. Myers & Co....dis 30 %
Grain Scoops, Pat. Cor'd Straps H. M. M. & Co...dis 30 %
" " " M. Rowland & Co..dis 30 %
" " " O. Ames & Son..dis 20 %
Sledges.—Smith's Stone or Coal Sledges—
Steel Face Polished........℔ 15c
Solid Cast Steel........" 35c
Snaths and Cradles.—Seymour Mfg. Co.'s..dis 20 %
Sorghum Machinery.—Bell Cane Mills....dis 15 %
Scantlin's Seamless Evaporators........dis 10 %
Springs.—Cleveland Spring Co.'s—
Carriage and Express........dis 12½ %
Blue Seat Springs........dis 15 %
Vises.—Solid Box........℔ 16c
Wilson Mfg. Co.'s........dis 15 %
Wheelbarrows.—Champion Iron Wheel..℔ doz $35·00
Champion Wood Wheel........℔ doz 3[illegible]
Wrenches.—Coes' Genuine........dis 33⅓ %
Coes' Pattern........dis 50
Wagons.—Whitewater Farm Wagons—
Thimble Skein........No. 3, $74; 3¼, $78; 3½, $79
Iron Axle........No. 1½, $75; 1⅝, $81; 1¾, $88

St. Louis Metal Market.

(Corrected Weekly by Messrs. R. Sellew & Co.)

Tin Plate.

IC, 10x14, Best Char..	$ 9·50	IX, 14x20, Roofing....	$11·50
IX, 10x14, "	12·00	IC, 20x28, "	19·00
IC, 12x12, "	10·00	IX, 20x28, "	23·50
IX, 12x12, "	12·50	IC, 10x14, Coke...	8·50 @ 9·00
IC, 14x20, "	10·50	IC, 14x20, "	9·00
IX, 14x20, "	13·00	IC, 10x20, "	14·00
IC, 14x20, Roofing....	9·00		

Usual difference for odd sizes.

Block Tin.
Large Pigs........25c | Bars........27c
Small " L. & F....... 26c |
Sheet Zinc.
Casks........℔ 10½c | Sheet........℔ 11c
Solder.
No. 1, Refined, in bars or plate........16c
No. 2, " " "........15c
Pig Lead........7½c
Sheet Copper.—14 to 100 lbs. Sheets 30x60........31c
10 to 12 lbs., " and 30x72........32c
6 to 9 lbs., " "........36c
Tinned, 14 and 16 oz. 14x48........52c
Planished, 14 and 16 oz. 14x48........39c
" No. 7, 8 and 9........41c
Copper Bottoms........34c

Sheet Iron.—	Com'n.	Sm'th.	Char'l.	Jun'ia
No. 16 to 20	4½c	4½c	6½c	7½c
No. 22 to 24	4½c	4½c	6½c	7½c
No. 26	4½c	5 c	6½c	8 c
No. 27	4½c	5½c	6½c	8½c

Galvanized Iron........dis 30 %
Iron Rivets........dis 25 %
Iron Wire........dis 35 %
Coppered Pail Bail Wire........dis 20 %
Copper Rivets and Burs........dis 20 %
Genuine Russia Iron.
Perfect—No. 9, 10, 11, 12........per lb. 17c
Stained—No. 9, 10, 11, 12........per lb. 16c
Tare 22 lbs to Bdle. For less than 1 Bdle. add 1c. ℔ ℔.
Retinned Stamped Ware........dis 20 %

CHICAGO.

(Reported by Frank Sturges & Co., 72, 74 & 76 Lake St.)
September 10, 1875.

Tin Plate.—

10x14, IC, Ch'l. Good $		14x20, IX, Ch' Best.	$13 00
10x14, IC, " Best.	9 50	14x20, IXX, " "	15 50
10x14, IX, " "	12 00	14x20, IXXX, " "	18 00
12x12, IC, " "	10 00	DC, 100 Plate, " "	9 50
12x12, IX, " "	12 50	DX, " "	12 00
14x20, IC, " "	10 50	DXX, " "	14 50
		DXXX, " "	17 00

Roofing IC, Charcoal, Best........9 00
Roofing IX, Charcoal "........11 50
20x28, IC, Charcoal Roofing, Com........18 00
20x28, IC, " Good........18 50
20x28, IC, " Best........19 00
20x28, IX, " "........23 50
10x14, IC, Coke Plates........8 50 to 8 75
14x20, IC, "........9 00 to 9 50
10x20, IC, "........14 00
Block Tin.—
Large Pigs........27c | Bars........29c
Small........28c |
Zinc.—Sheet, 500 to 1000 lb. Casks........10½c
Loose Sheets........11c
Slab Zinc or Spelter........7½c
Copper.—Bottoms........34c
Sheathing........32c
Planished........39c
" Boiler lengths........41c
Ingot........—
Bolt........35c
Braziers' Sheets.—
30x60, 6 & 7 lbs.....℔ 39c | 30x60, 10 & 12 lbs...℔ 35c
30x60, 8 & 9 lbs....." 37c | 30x60, 15 to 100 lbs. " 32c
Solder.—F. S. & Co.'s make.
Best Fine........20c
No. 1........19c
Roofing........17c
Braziers' or Spelter Solder........36c
Antimony........18c
Babbit Metal—F. S. & Co.'s........16c
No. 2........14c
Sheet Iron.—

	Common.	Smooth. Com.	Smooth Charcoal.	Smooth Juniata
No. 24	4½c	5½c	6½c	8½c
25 & 26	4½c	5½c	7 c	9 c
27	4½c	6 c	7½c	9½c

Galvanized Iron........dis 30 %
No. 16 to 20........12c | No. 27........15c
21 to 24........13c | 28........16c
25 & 26........14c |
Russia Iron.— | No. 1 Stained........16c
Perfect........17c | In Sheets, 1c. higher.
American Russia.— | B........11c
A........14c | In sheets, 1c higher.
Lead.— | Lead Pipe, in full coils..8½c
Pig........7½c | Lead Pipe, when cut...8¾c
Bar........8½c | Sheet Lead........9½c
Wire—Bright........dis 15
Coppered........dis 25

TO ALL WHO USE STEAM-POWER!

We will put our Governor on any Engine, and guarantee it to prove itself superior to all others.

If, after a fair trial, it does not, we will take it off at our own expense.

ShiveGovernorCo

BETHLEHEM, PA.

ALSO,

SHIVE'S PATENT WATCHMAN'S CLOCK AND DETECTOR,

AND

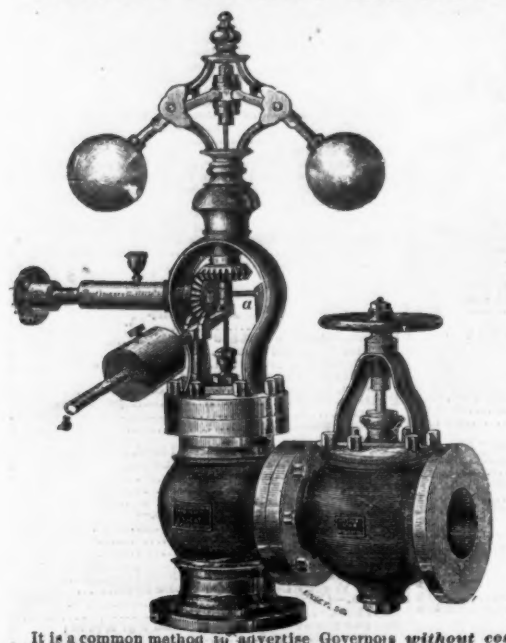
Buoy's Patent Counter Scale,

No Nest of Weights.

Circulars sent free

February 10, 1875. REDUCED PRICE LIST OF THE

JUDSON PATENT IMPROVED GOVERNORS.



☞ When Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Black, Finished or Portable, as you may require, and with or without Lever Attachment.

For dimensions and other particulars send for Illustrated List.

Capacity of Valve or Diameter of Steam Pipe in inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment for altering speed.	Price of Stop Valve.
¾	18·00	20·00	17·00	..	..
¾	20·00	22·00	19·00	..	..
1	24·00	27·00	22·00	2·00	5·25
1¼	29·00	32·00	27·00	2·25	6·60
1½	34·00	38·00	31·00	2·50	8·50
2	41·00	46·00	38·50	2·75	11·50
2¼	47·00	54·00	..	3·25	16·00
2½	50·00	57·00	47·00	3·50	17·00
2¾	55·00	62·00	..	3·75	19·00
3	62·00	70·00	No Larger Portable made than 2½ in.	4·25	22·00
3¼	71·00	80·00		4·50	27·00
4	81·00	92·00		5·00	32·00
4½	91·00	103·00		5·50	37·00
5	102·00	114·00		6·00	42·00
5¼	116·00	129·00		6·50	48·00
6	134·00	148·00		7·00	55·00
7	160·00	176·00		8·00	69·00
8	199·00	219·00		9·00	83·00
9	230·00	255·00		10·00	..

No Charge for Boxing & Cartage.

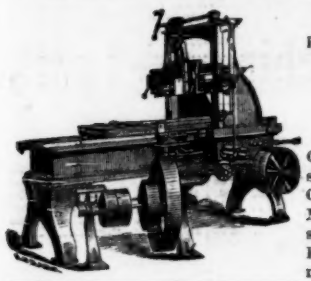
It is a common method to advertise Governors *without cost*, unless satisfactory to the customer, and then charge *High Prices* for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the above list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

JUNIUS JUDSON & SON, Rochester, N. Y.

The Pratt & Whitney Co.,

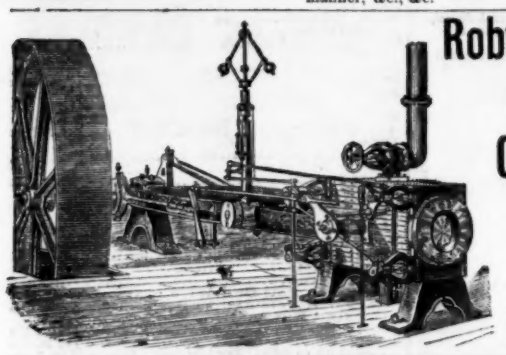
Hartford, Conn.,

Have constantly on hand and making



Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



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Corliss Engine BUILDERS

AND

Boiler Makers.

THORNE, DeHAVEN & CO.

21st Street, above Market,
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DRILLING MACHINES.

PORTABLE DRILLS. Driven by power in any direction, self-feed and convenient adjustment.

RADIAL DRILLS. Self-feed—large adjustable box table—separate base plate, every convenience.

VERTICAL DRILLS. Self-feeding—of new and improved designs.

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HORIZONTAL BORING AND DRILLING MACHINES. For large pieces—with boring head, adjustable, vertically and horizontally.

SPECIAL DRILLS. For special work. Gun Blank Drills, Coal Drills, &c., built to order.

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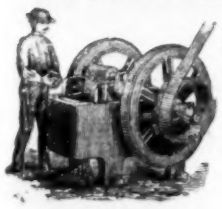
STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS It is extensively in use in MINING operations, for crushing

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Also for crushing **Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Plaster, Soapstone, &c.**

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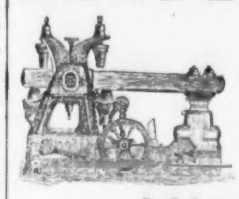
BRADLEY'S CUSHIONED HAMMER



Has Larger Capacity,

Is More Durable, takes up Less Room, does More and Better Work with less expense for Power and Repairs than any other Hammer in use.

GUARANTEED as RECOMMENDED.

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Knowles Patent Steam Pumps

MANUFACTURED BY THE

KNOWLES STEAM PUMP WORKS,

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WAREHOUSES:

14 & 16 Federal Street, Boston, 92 & 94 Liberty Street, N. Y.

Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

FIRE PUMPS, a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern,) which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best.

Every machine furnished under a complete guarantee.

Morse Twist Drill and Machine Company,

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

Beach's Patent Self-Centering Chuck, Solid and Shelf Reamers.

All Tools exact to Whitworth's Standard Gauge.

Drills made to fit any socket des

H. S. MANNING & CO.,

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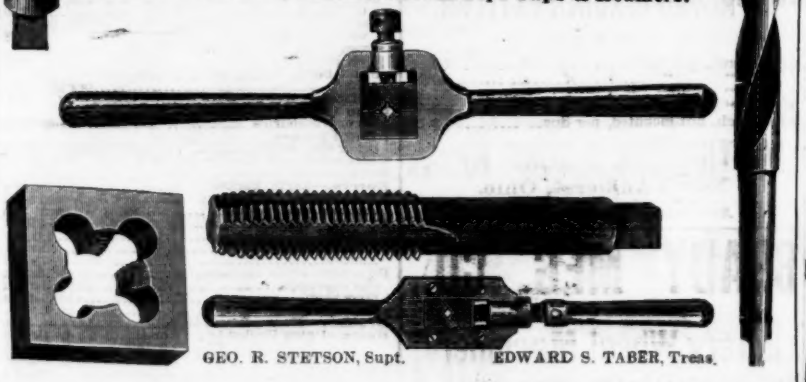
For our manufactures of **V and Franklin Institute Standard Shape of Threads, Pat. Machine Relieved Nut-Hand Blacksmith and Machine Screw Taps and Dies, Screw Plates and Tap or Reamer Wrenches, Patent Relieved Pipe Taps & Reamers.**



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THE HENDEY MACHINE CO.

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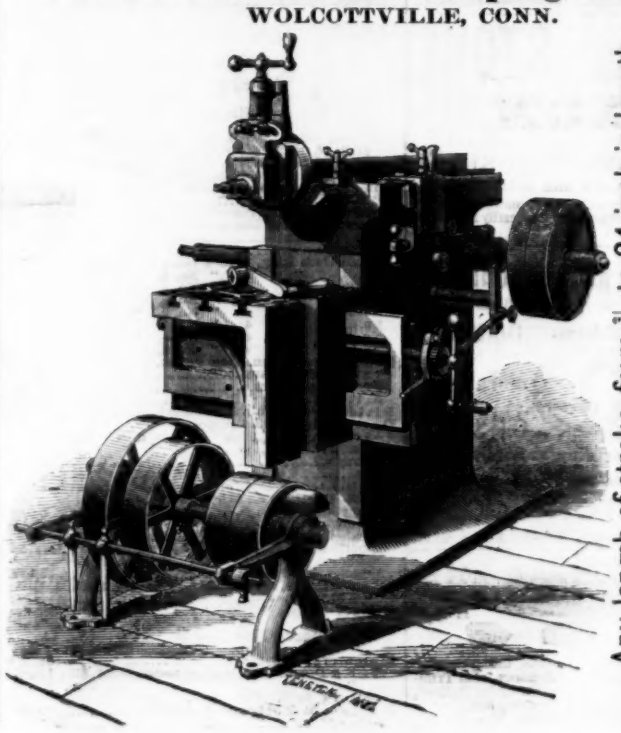
THE MANVILLE

Patent Planers and Shaping Machines.

WOLCOTTVILLE, CONN.



Any length of stroke from ¾ to 24 inch in length, while machine is running with perfect uniformity of speed of cutting tool. Automatic cross feed of 19 inch and 16 inch, from top of table to bottom of slide when table is down. Send for Circular and Price List.

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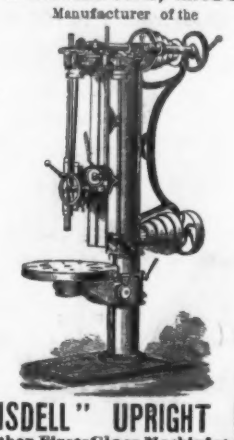

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A pure Lubricator, free from water, gum or sediment. The best article made for *Wagons, Open Journals, Cog Wheels Rollers* and wherever a *Solid Lubricator* or *Grease* can be applied. Put up in Boxes, Kegs and Barrels. For prices see New York Price List in this paper.

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Engine Lathes

SCREW MACHINES, &c.

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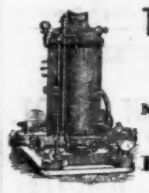

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Half Cloth.....**$1·00 each.**
(Cloth Back and Corners, with Morocco Paper Sides—a good, serviceable Binder.)

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The above are all in black, which is the most serviceable color, with the exception of the Half Morocco, which are put up in a number of handsome shades. The name of the paper is stamped in gold on either side, and each Binder is furnished with loops by which it can be hung up against the wall as newspaper files are usually disposed of.

The Binders will each hold the twenty-six numbers in the form of a bound volume. They can be nicely inserted in two or three minutes by any boy of ordinary intelligence; and when the covers are full they can be either preserved in that shape as bound volumes of *The Iron Age*, or they can be emptied and used again. There is no possibility of their getting out of order, unless the cords, which are very strong, wear out, when anyone can easily replace them with a piece of fishing line or other suitable string. Subscribers who value the paper should order them at once, so as to keep the paper in good order

On receipt of the price we will ship them, safely put up, by any express line or to any New York house to be packed. They are too large to go by mail.

Machinery, &c.

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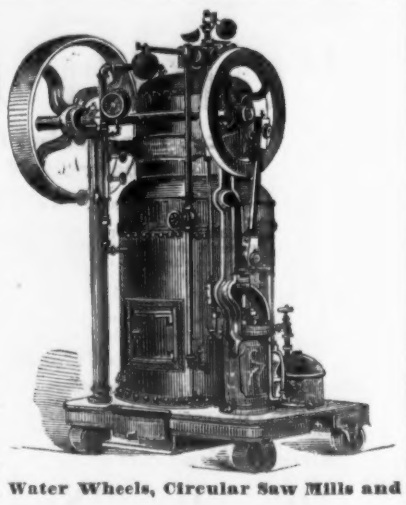

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PRACTICAL,
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$200·00.

Cheaper than any Engine offered of the same capacity.

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Manufacturers of **Steam Engines, Boilers, Water Wheels, Circular Saw Mills and Mill Work generally.**

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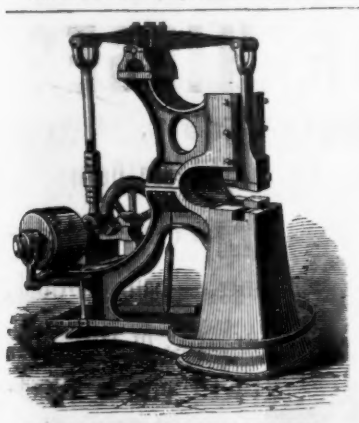
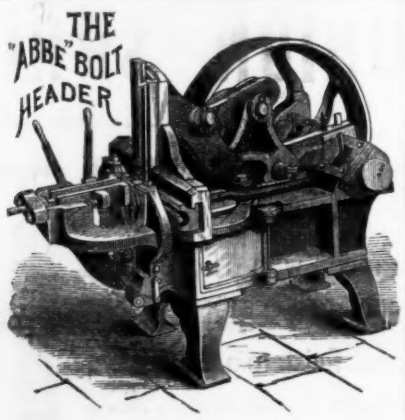
From twelve (12) to forty-eight (48) inches swing:

Hand Lathes; Wood Turning Lathes; Vertical Drills; Boring Mills; Tapping and Centering Machines; Screw Press for Mandrels Grindstone Boxes.



THE PALMER POWER SPRING HAMMER.



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SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes; Clamp Heads and Screws; Parallel Bench Vises; Sash Pullies, Hoe, House Pullies, Composition Cocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

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MAKER AND PATENTEE OF

Hydraulic Jacks and Punches,

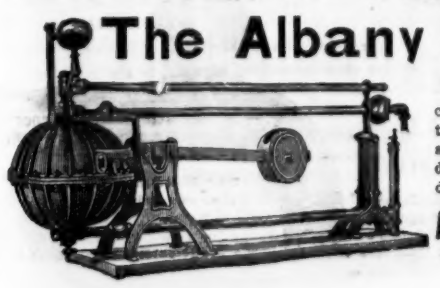
ROLLER TUBE EXPANDERS

And Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order

The Albany Steam Trap.



This Trap automatically drains the water of condensation from *Heating Coils*, and returns the same to the Boiler *whether* the Coils are *above or below* the water level in Boiler, thus doing awa with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company,
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Machinery, &c.

Established 1848.

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Engineers, Iron Founders and Machinists.

RAILWAY SHOP EQUIPMENTS.

Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters

Are of Improved and Patented Construction.

Railway Turning and Transfer Tables,

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Pivot Bridges.

GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.

Fairmount Machine Works,

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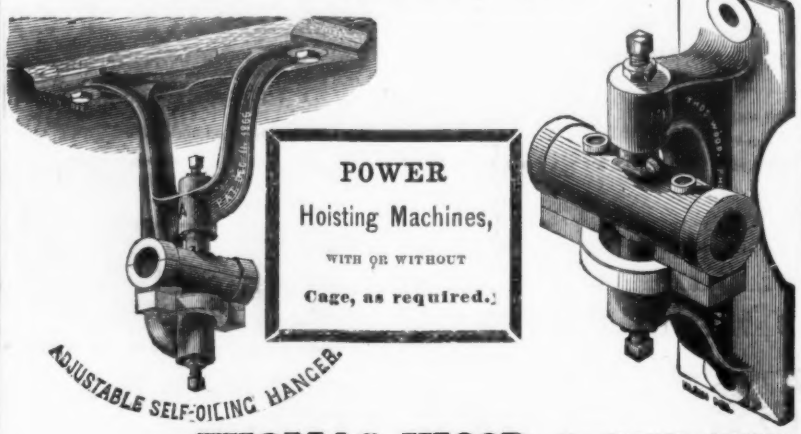

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POWER LOOMS, with (new) Patent Box Motion. SPOOLING, BEAMING, DYEING and SIZING MACHINES.
BOBBIN WINDING MACHINES—wind direct from hank or skein to shuttle bobbin.
SHAFTING, with Patent Adjustable Self-Oiling Bearings.
PLANS taken, and FACTORIES fitted out complete with Shafting and Gearing.
PULLEYS, from 4 inch to 10 feet diameter, of most Approved Pattern.
SELF-ACTING WOOL SCOURING MACHINES, (Yewdall's Patent.)
Machine and Foundry Work in all their branches. Send for Price List of Pulleys & Shafting.

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COVERING ALL LOSS OR DAMAGE TO

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ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS

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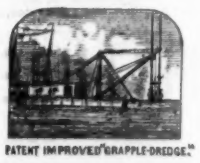
THE AMERICAN DREDGING CO.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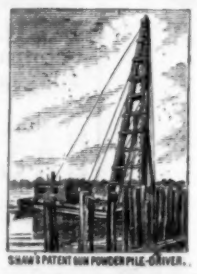
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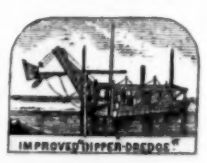
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BUILDERS OF STEAM DREDGING MACHINES,

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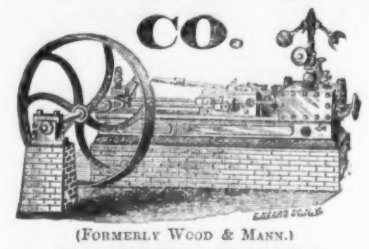

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STATIONARY & PORTABLE

STEAM ENGINES,

The best and Most Complete Assortment in the Market.

These Engines have always maintained the very highest standard of excellence. We make the manufacture of Engines, Boilers and Saw Mills a specialty. We have the largest and most complete works in the country, with machinery specially adapted to the work.

We keep constantly in process large numbers of Engines, which we furnish at the very lowest prices and on the shortest notice. We build Engines specially adapted to Mines, Saw Mills, Grist Mills, Tanneries, Cotton Gins, Threshers and all classes of manufacturing.

We are now building the celebrated Lane Circular Saw Mill, the best and most complete saw mill ever invented.

We make the manufacture of Saw Mill Outfits a special feature of our business, and can furnish complete on the shortest notice.

Our aim in all cases is to furnish the best machinery in the market, and work absolutely unequalled for design, economy and strength.

Send for Circular and Price List.

UTICA STEAM ENGINE CO.,
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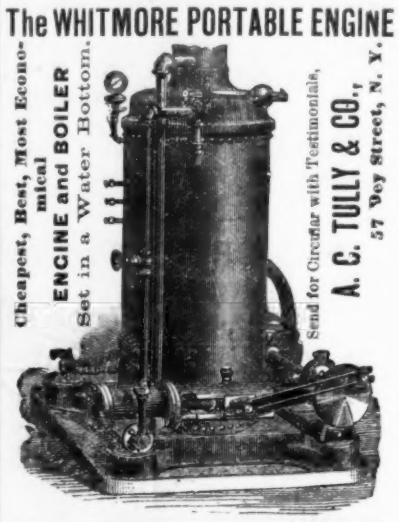
The WHITMORE PORTABLE ENGINE



Cheapest, Best, Most Economical **ENGINE and BOILER** Set in a Water Bottom.

Send for Circular with Testimonials,

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Superior to any other Light for Mining Purposes. Manufactured by

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JOHNSON'S PATENT UNIVERSAL LATHE CHUCK.

We invite attention to the superior construction of this chuck. Its working parts are **absolutely protected from dirt and chips.** It is strong, compact and durable, and will do the greatest variety of work, as the jaws are adjustable with a range the full diameter of the chuck. For Price List address,

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The HARTFORD GOVERNOR CO.,

Sole makers of the

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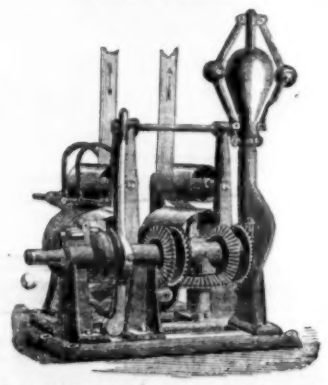
FOR WATER.



Powerful, positive, radically new. Introduced and working with complete success. Write us for circular etc., at

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MANUFACTURER OF

ANTI-FRICTION METALS.

XXX Genuine	40c	C	20c
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X	35c	E	13c
A	30c	F	11c
B	25c		

"Note."—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

BRASS CASTINGS, 21 to 35c. | **INGOT BRASS,** 19 to 28c. | **BRASS TURNINGS AND OLD METALS WANTED.**

ESTABLISHED 1842.

WM. & HARVEY ROWLAND,

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P. O. Address: Frankford, Philad'a. | MANUFACTURERS OF ALL KINDS OF

Elliptic, Platform AND C Springs,

MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.
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BESSEMER SHOVEL AND PLOW STEEL.
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RE-ROLLED NORWAY SHAPES.
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

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Steam, Gas AND Water Work Supplies.

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INCORPORATED 1875. THE REDFIELD, BOWEN & WALWORTH COMPANY. CHICAGO.

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MALLEABLE, GRAY Iron & Brass CASTINGS To Order.

SALESROOMS: 112, 114 and 116 LAKE STREET.
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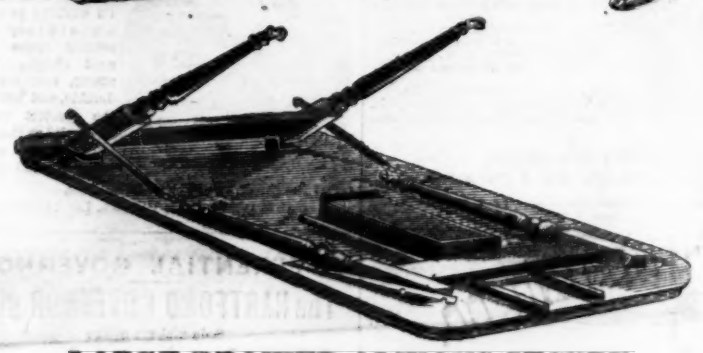
FIRM, DURABLE and CHEAP.



LARGE DRAWER ALWAYS SECURE.

PRICE FROM $2·00 TO $4·00. Agents wanted. Terms liberal.

JOHN G. MAIRS, - - - Troy, N. Y.

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79 Reade Street, New York. Agent for

North Carolina Handle Co.,

(WILSON & SHOBER, Proprietors.)

Manufacturers of *SPOKES, AXE, PICK, SLEDGE, HAMMER, HATCHET, and other Handles.* Full assortment always on hand.

NEW TIME TABLE.

Great Reduction in Time and Labor to the Farmer by using

Nellis' Original

HARPOON HORSE HAY FORK,

Nellis' Grapple.

Grapple and Pulleys; also, Nellis' Patent Stacker and Method of conveying Hay, Straw, &c. A ton of Hay can be delivered in three to five minutes to any part of Mow or Stack. The right of Stacker and Conveyer granted FREE to the Farmer purchasing our Horse Hay Fork and Fixtures during season of 1875.

With it Pulleys can be attached or detached to rafter or beam, without the use of a ladder.

NELLIS' PULLEY,

Improved Wrought Frame, Prepared Wood Wheel. Warranted superior to any Horse Fork Pulley offered in the market.

A trial of these goods will convince any farmer that he cannot afford to dispense with them, as their entire cost is often times saved by a single day's use.

Also manufacturers of all descriptions

Of Agricultural Steel & Iron,

Steel Tempered by Nellis' process to suit every kind of soil.

Prices and descriptive Catalogues of our goods furnished free. Address,

A. J. NELLIS & CO.,
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General Agents for the Southwest.

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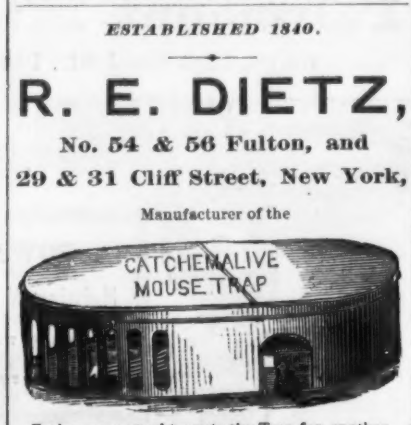
R. E. DIETZ,

No. 54 & 56 Fulton, and
29 & 31 Cliff Street, New York,

Manufacturer of the



Each mouse caught resets the Trap for another.

TUBULAR

And Other

Patent Lanterns

BRASS AND IRON

Jack Chains.

STANLEY G. FLAGG & CO.

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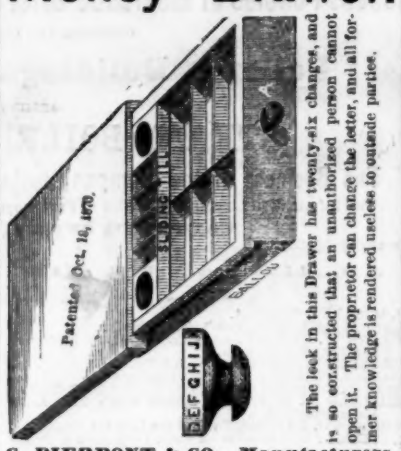
Office and Warehouse,
No. 216 & 218 N. THIRD ST.
Manufacturers of

STEEL CASTINGS.

A Substitute for Steel and Wrought Forgings.
☞ Circulars sent on application.

EXCELSIOR

Money Drawer.



The lock in this Drawer has twenty-six changes, and is so constructed that an unauthorized person cannot open it. The proprietor can change the letter, and all former knowledge is rendered useless to outside parties.

C. PIERPONT & CO., Manufacturers,
New Haven, Conn.
Semple, Birge & Co., General Western Agents,
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"Lowest Priced and BEST."

Do Your Own Printing!

$3 Press for cards, labels, envelopes, etc. Larger sizes for larger work.

Business Men do their printing and advertising, save money and increase trade. Pleasure and profit in Amateur Printing. The Girls or Boys have great fun and make money fast at printing. Send two stamps for full catalogue of presses, type, etc., to the Manufacturers,

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GAS FIXTURES.

Lamps, Bronzes,

Equal to any made, in great variety, all of our own manufacture.

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SALESROOMS:
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J. M. EVERHART,

Manufacturer of Brass Work for Water, Gas and Steam. Brass Castings and Jobbing promptly attended

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DIXON'S PURE PLUMBAGO FOR LUBRICATING.

Put up in Boxes containing 5, 10, 25 and 50 lbs. and in barrels of 200 lbs.

This article is prepared with great care, has more body than that prepared by any other party, and is as near perfect as possible.

We were the first manufacturers to put up Plumbago as a Lubricator; and the experience of years has shown that it will save more than half the expense of oil or grease, will absolutely cool off a hot journal, and save nearly all the wear, the axles or shafts being glazed over with it, and running almost without wear. A car axle will run four or five times as long if our Lubricating Plumbago is used freely. A second-class article, however, is worse than none, because it contains a grit that will wear both the shaft and the box.

If Engineers, Experts and Purchasing Agents knew how much wear and power would be saved by its use, no shaft or axle would revolve without it; every shop and car would have it at hand.

The Journal of the Franklin Institute says:

"Every one knows that for heavy machinery plumbago is a good lubricant, but every one does not always think of applying it where it would serve best. It may be of value to some of our readers to know that a planer whose bed-plate required the force of eight men to slide it when lubricated with the best ordinary material, was easily shifted with one hand when plumbago of good quality was applied."

It is pure, very finely pulverized, is free from grit, and is prepared by the most expert manufacturers of **PLUMBAGO GOODS** in the world. Send for envelope sample.

THE JOS. DIXON CRUCIBLE CO.,

ORESTES CLEVELAND, President,

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Russell, Burdsall & Ward,

PORT CHESTER, N. Y.

Manufacturers of

Carriage, Tire, Plow, Stove AND OTHER BOLTS.

Carriage Bolts made from Best Square Iron, a Specialty.

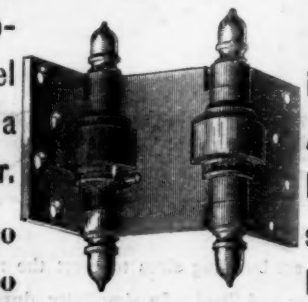
UNION SPRING HINGES.

DOUBLE OR SINGLE ACTING.

Especially adapted for Mosquito, Fly and Screen Doors.

Size 2½x2½, Japanned, with Nickel Plated Tips—giving a neat finish to a door.

Single Acting, Per Pair - - $1·00
Double Acting, Per Pair - - $2·00



To dealers ordering 4 pairs Double Acting, of this size, I will give a handsome Black Walnut Model.

The DOUBLE ACTING UNION SPRING HINGE is the best and cheapest appliance known for swinging a light door both ways.

WAREROOMS, 79 Chambers St., N. Y.

M. W. ROBINSON, Sole Agent.

THE

American Spiral Spring Butts

ARE

Very Desirable

FOR THE DOORS OF

Banks, Stores, Churches & School Houses.

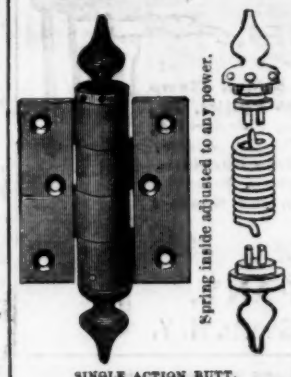
AND FOR ALL

Outside Winter Doors.

Used on the

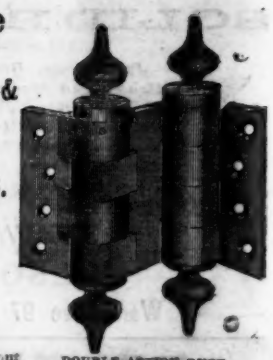
National Capitol,
Patent Office,
Treasury,
Plymouth Church,
A. T. Stewart's Stores,
Booth's Theatre,
Windsor Hotel,

and on prominent buildings throughout the country.



SINGLE ACTION BUTT, SWINGS DOOR ONE WAY.

Spring inside adjusted to any power.



DOUBLE ACTION BUTT, SWINGS DOOR BOTH WAYS.

MANUFACTURED BY

AMERICAN SPIRAL SPRING BUTT CO., 82 Beekman Street, N. Y.

DERBY SILVER CO., Derby, Conn.,

Manufacture the most reliable

SILVER PLATED SPOONS & FORKS.

They are plated by weight, and not by time or guess, containing 20 per cent. more silver than the usual standard, on a base of Nickel Silver, and finished by hand. Each article is guaranteed by the trade mark and warranted to give full satisfaction. We ask of the trade a fair and impartial test, assuring them that the high standard already attained, shall be maintained. Send for Catalogue and Price.

Schofield's Pat. Gauge Cock.

HENRY C. MEYER & CO.,

Manufacturers of

BRASS WORK

For Water, Gas and Steam.

Importers and Dealers in PLUMBERS' MATERIALS,
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Specialties manufactured and controlled by us: Fuller's Patent Faucets and Mineral Water Cocks; Murdock Hydrants and Street Washers; Flower's Open Way Valves; Schofield's Gauge Cocks; Hall's Lock Gas Cocks. Illustrated Catalogues expressed to the trade on application, where this advertisement is referred to.

The Most Durable for Hot or Cold Water ever made.